

## Evaluation of the Effects of Pulsed Radiofrequency in the Treatment of Lumbar Radicular Pain in Iraqi Patients in A Cross-Sectional Study of 90 Patients

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**Abstract:** The present study has been designed to assess the outcomes of pulsed radiofrequency in the treatment of lumbar radicular pain in Iraqi patients. The study comprised patients suffering from lumbar radicular pain, with demographic information and data collected from multiple hospitals over a three-year period from 2021 to 2024. Following the acquisition of approval from the hospital ethics committee and the attainment of verbal and written consent from patients, In this study, 90 patients suffering from severe lumbar radiculopathy pain (as indicated by the Oswestry Disability Index) were observed over a period exceeding three months. The results of the study were found to be consistent with the methodology employed, with positive cases reporting an improvement ranging from 40 to 60% and a short-term outcome. The current study demonstrated an improvement in pain in all cases where treatment was administered. Furthermore, the results of continuous radiofrequency treatment revealed a decrease in pain among patients who received the treatment, as measured by pain scales. Nevertheless, the majority of studies failed to demonstrate statistically significant differences. The randomised clinical trials that have been analysed in this report suffer from several limitations, with generally moderate methodological quality. The studies demonstrate heterogeneity with regard to efficacy outcomes.

- Radiofrequency therapy may be effective in treating chronic back pain according to the pain rating scales used in the studies. Statistically significant differences between the patient groups before and after treatment were only observed in two studies, favouring the group treated with continuous radiofrequency. Furthermore, patient satisfaction levels demonstrated no statistically significant differences when comparing continuous radiofrequency with other treatment modalities.

**Keywords:** Pain, Pulsed Radiofrequency, Treatment Of Lumbar, Radicular, Spinal Stenosis, Stiffness, Efficacy.

### INTRODUCTION

Low back pain is characterized by discomfort, tension, or stiffness in the muscles located below the rib cage and above the lower border of the buttocks and may or may not be accompanied by leg pain, also known as sciatica [Trinidad, J. M. *et al.*, 201]. Approximately 90% of patients with symptoms in this area do not know the cause of their lower back pain. Between 9.9% and 25% of people experience low back pain, with leg pain extending below the knee each year [Zeng, Z. *et al.*, 2016]. The presence of nerve root problems may be indicative of an underlying condition. The most prevalent cause of lumbar radicular pain is typically a herniated intervertebral disc (IDH), followed by failed back surgery (FBSS) and spinal stenosis (SS). [Imani, F. *et al.*, 2012; Sluijter, M. E. *et al.*, 2013] The utilization of medications, such as paracetamol, non-steroidal anti-inflammatory drugs, and opioids, has been proposed as a potential management strategy for radicular pain. However, there is an absence of compelling evidence to support the prescription of any specific medication. In cases of sciatica, the utilization of pulsed radiofrequency therapy typically does not result in a temporary escalation

in pain; however, improvements may become evident after a week [Imani, F. *et al.*, 2012; Lee, D. G. *et al.*, 2016; Simopoulos, T. T. *et al.*, 2008]. In instances where conservative treatment proves ineffective or where significant neurological impairment is present, surgery (including discectomy, micro discectomy, and other microsurgical techniques) is generally recommended for carefully selected patients with severe symptoms [Van Boxem, K. *et al.*, 2015].

In terms of short-term pain relief, surgery has been shown to yield superior results in comparison to long-term conservative care; however, no significant difference between surgery and conservative treatment has been found after one to two years. It is important to note that surgery is associated with several adverse effects. [Van Boxem, K. *et al.*, 2010]

Pulsed radiofrequency (PRF) therapy for lumbar radicular pain (LRP) has demonstrated encouraging outcomes, particularly when certain parameters are optimised. Recent studies have underscored the significance of external current settings, duration of application, and voltage in

enhancing treatment efficacy. The PRF therapy method involves the intermittent delivery of a high-frequency current. The primary objective is to maintain an ambient temperature below the critical limit of 42°C, thereby averting potential neuronal damage [Cohen, S. P. *et al.*, 2010]. The underlying mechanism of action of PRF differs from that of conventional continuous radio frequency (CRF). In contrast to CRF, which relies on continuous administration, resulting in elevated temperatures and tissue heating, PRF utilizes intermittent administration to circumvent the attainment of a critical threshold. This approach precludes the occurrence of thermal coagulation. [Shanthanna, H. *et al.*, 2014]

The efficacy of PRF has been demonstrated in numerous clinical applications, encompassing a broad spectrum of spinal pain conditions, including cervical radicular pain, posterior degenerative spine disease, disc-related diseases, sacroiliac joint pain, spondylolisthesis, and infections. [Cahana, A. *et al.*, 2006]

## MATERIAL AND METHOD

The present study comprised patients suffering from lumbar radicular pain, with demographic information and data collected from multiple hospitals over a three-year period from 2021 to 2024.

Following the acquisition of approval from the hospital ethics committee and the attainment of verbal and written consent from patients, 90 patients with severe lumbar radiculopathy pain according to Oswestry Disability Index and symptoms persisting for a duration exceeding 3 months, for which conservative treatment (comprising oral and epidural medications) had proven ineffective, and exhibiting signs of

radicular involvement (with or without numbness and hypoesthesia) and distribution consistent with the affected dermatome, were included in the study. The inclusion criteria included the presence of radiological evidence on magnetic resonance imaging (MRI) of a contained disc herniation with or without disc degeneration. Exclusion criteria included the presence of a disc fragment on MRI and the presence of a significant neurological deficit associated with disc disruption, indicating the need for surgical intervention.

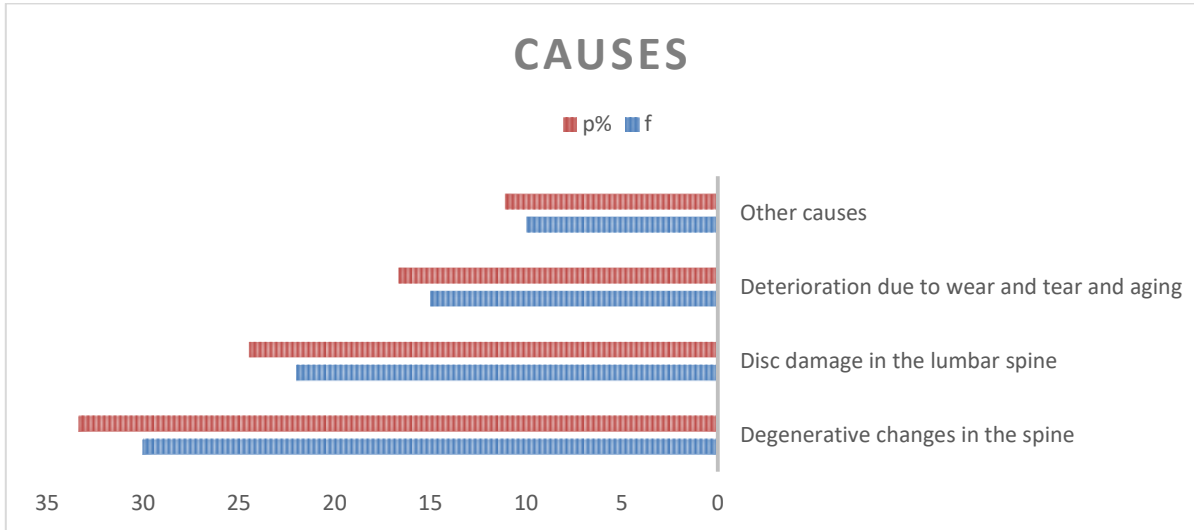
Refractory to conservative treatment (which included oral and epidural medications), signs of radicular involvement with or without numbness and hypoesthesia, and with a distribution consistent with the affected dermatome were included in the study. The inclusion criteria included the presence of radiological evidence on magnetic resonance imaging (MRI) of a contained disc herniation with or without disc degeneration. The exclusion criteria included the presence of a disc fragment on MRI and the presence of a significant neurological deficit associated with disc disruption, indicating the need for surgical intervention. The approach was performed in the operating room, using fluoroscopy and with the patient in the prone position. The area to be treated was identified by placing the arch in an anteroposterior position and perpendicular to the axis of the spine, after which the beam was moved cranially or caudally and slightly obliquely towards the side of the lesion until a linear view of the superior or inferior plates was obtained, thereby eliminating the double contour of the disc once the intervertebral space was identified.

## RESULTS

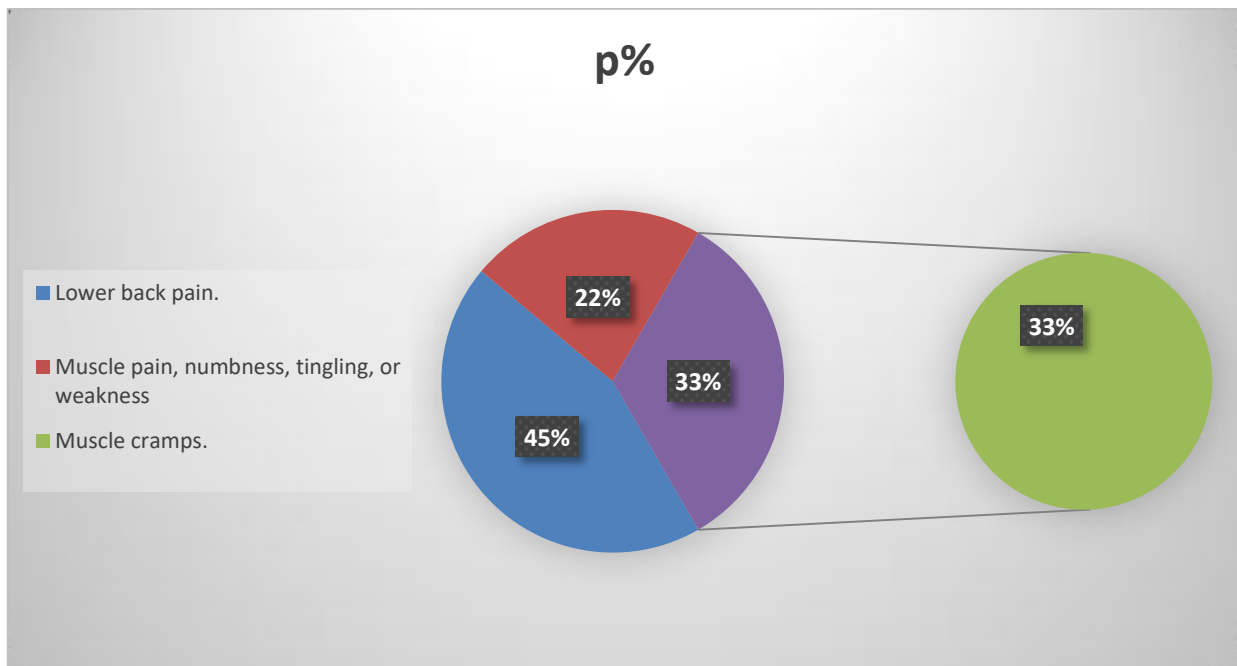
**Table 1:** Description of demographic results, data, and information for 90 Iraqi patients

Variable	F	P%
Age		
50-54	20	22.22
55-59	40	44.44
>60	30	33.33
BMI		
Obese	60	66.67
Over obese	30	33.33
Comorbidities		
High blood pressure	25	27.78
Diabetes	15	16.67
Joint diseases	10	11.11
None	40	44.44
Gender		

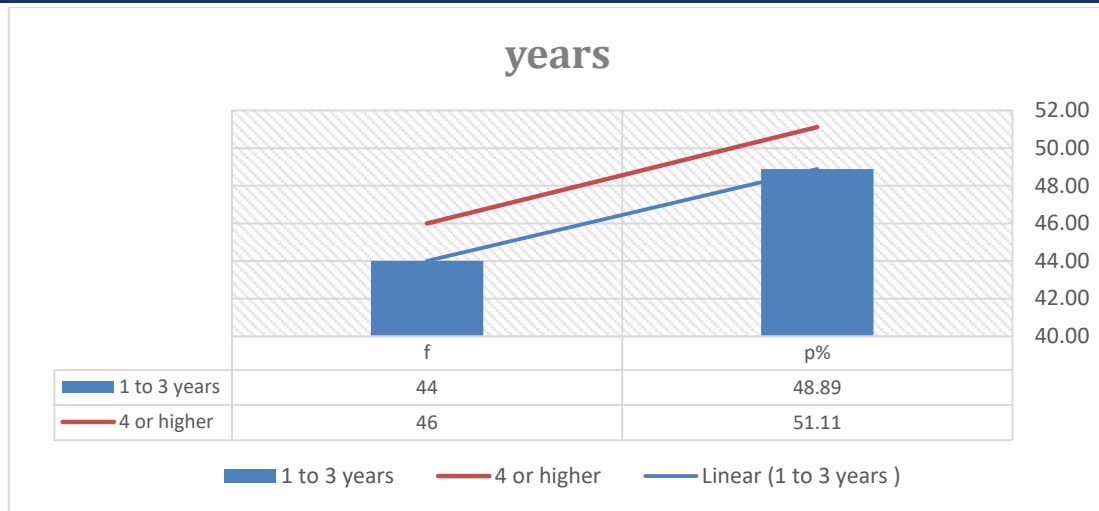
Male	50	55.56
Female	40	44.44
Incomes\$		
>600	60	66.67
<600	30	33.33
Smoking		
Yes	12	13.33
No	78	86.67



**Figure 1:** Distribution of patients in this study according to the cause of LUMBAR RADICULAR PAIN



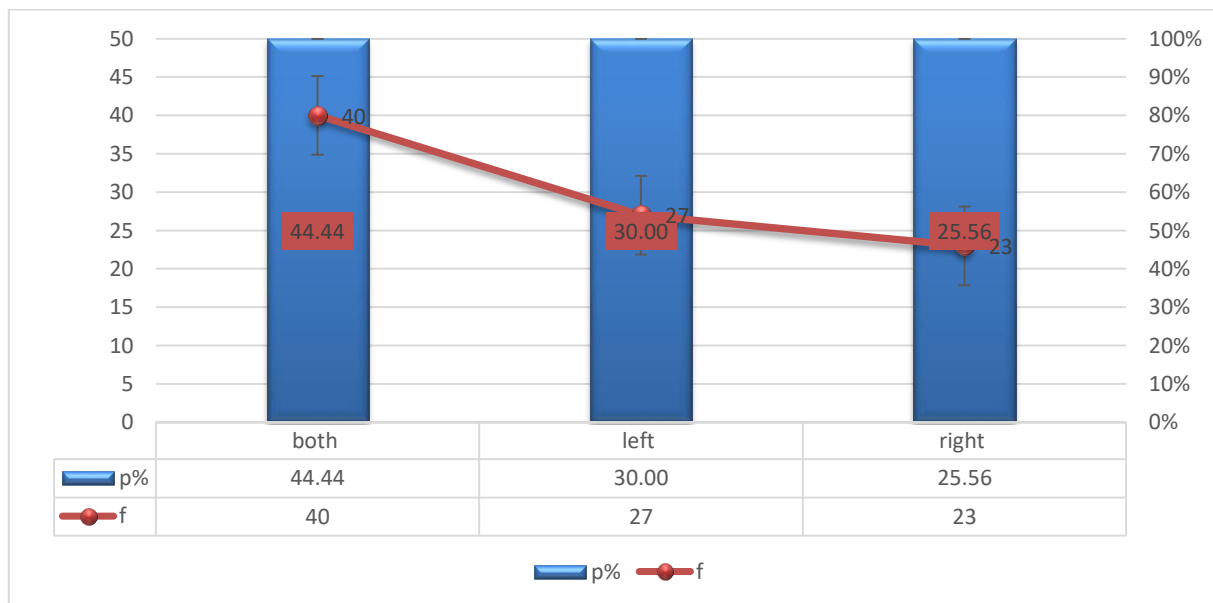
**Figure 2:** Distribution of Iraqi patients according to symptoms in this study



**Figure 3:** Health outcomes of Iraqi patients according to Duration of pain (years)

**Table 2:** Evaluation of pain scores and quality of life of patients before PULSED RADIOFREQUENCY IN THE TREATMENT

Variable	Value
Physical functioning	49 (3.9)
Role physical	52.5 (1.838)
Bodily pain	61.2 (4.2)
General Health perception	49.85 (4.1)
Energy/Vitality	45.5 (3.2)
Social functioning	50.1 (2.893)
Role emotional	48.8 (8.3)
Mental health	49.9 (3.9)
	52.3 (3.9)



**Figure 4:** Patients evaluated the results of pulsed radiofrequency treatment according to the aspect of pain.



Figure 5: Level of Radiofrequency of Iraqi patients as shown in the figure below

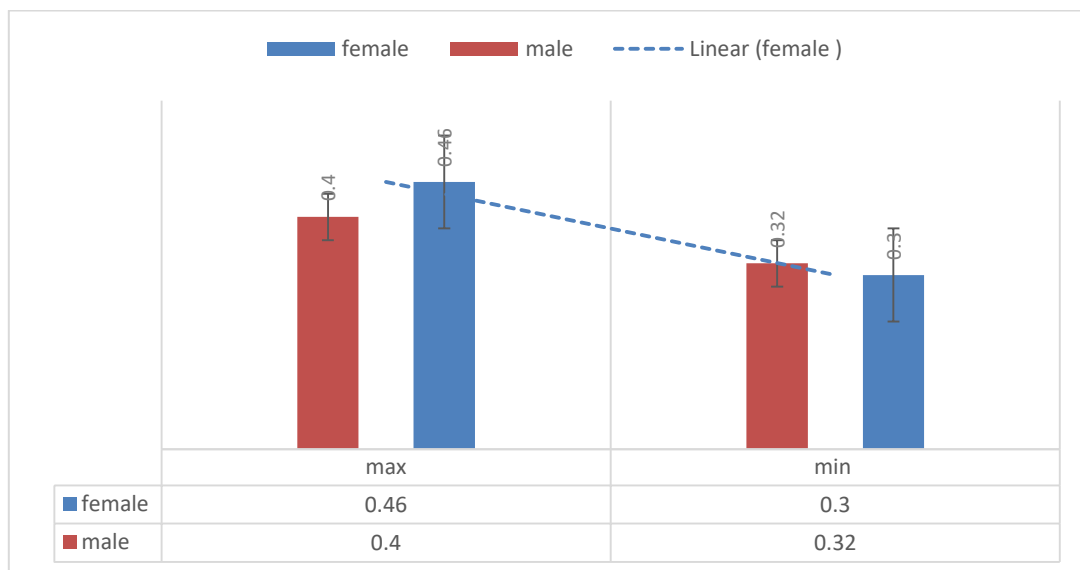


Figure 6: outcomes of Sensory threshold (V) (the weakest stimulus that an organism can sense)

Table 3: As illustrated, the current (mA) of patients with pulsed radiofrequency in the treatment of lumbar radicular pain is demonstrated.

Variable	Male	Female	P-value
Initial mean (sd)	202 (5.9)	208 (6.3)	<0.001
Final mean (sd)	188.9 (7.2)	199.1 (4.4)	

Table 4: Final results of the study according to Change of Oswestry Disability Index

Variable	Outcomes
Pretreatment	55.4±4.9
Post 1 month	37.6±4.2
Post 2 month	33.4±2.9
Post 3 month	31.3±1.55

**Table 5:** Side Effects Of Pulsed Radiofrequency In The Treatment Of Lumbar Radicular Pain

Variable	f	P%
Bruising around the treatment area.	2	2.22
The pain gets worse before it gets better.	4	4.44
A feeling of numbness, heaviness, or tingling.	2	2.22
None	82	91.11

## DISCUSSION

This report synthesizes the extant scientific literature concerning the efficacy and safety of employing radiofrequency techniques to treat lower back pain in Iraqi patients suffering from chronic back pain. Radiofrequency techniques are non-surgical procedures that generally rely on the interruption or destruction of pain transmission by temporarily or permanently blocking nerve fibers. In recent years, various forms of conventional (continuous) radiofrequency have emerged, including pulsed radiofrequency and cryo-radiofrequency. A significant body of research has been dedicated to evaluating the efficacy of these novel techniques in addressing various forms of chronic pain.

The objective of this study is to evaluate the effectiveness of radiofrequency techniques in the treatment of chronic back pain. The results of this study are divided into three sections, according to the type of radiofrequency analyzed. The results of continuous radiofrequency demonstrate a reduction in pain among treated patients, as measured by pain scales. However, the majority of studies did not reveal statistically significant differences. In contrast, pulsed radiofrequency, when compared with continuous radiofrequency, yielded no superior outcomes. However, when pulsed radiofrequency was compared with placebo or other interventions, it demonstrated superior pain-relieving outcomes in the treated group, although no statistically significant differences were identified in any of the studies. Finally, the results of cryogenic radiofrequency up to three months after the intervention were positive in the treated group. However, after three months, due to the overlap between the patient groups, the results cannot be considered for the evaluation of the technique. [Cahana, A. *et al.*, 2006]

The effects of lumbar radiofrequency treatment have been observed to persist for a period ranging from several months to a year. In certain cases, additional sessions may be necessary to maintain the treatment's outcomes. While the safety of lumbar radiofrequency treatment is comparable to that of other medical procedures, the potential for

adverse effects exists [Simopoulos, T. T. *et al.*, 2008].

These symptoms may include transient discomfort at the site of application, mild swelling, or contusions. However, these effects are usually minor and transient [Simopoulos, T. T. *et al.*, 2017].

Research has been published on the use of conventional radiofrequency (RC) at 67 °C for the treatment of neck and arm pain and back pain [Sapunar, D. *et al.*, 2005]. The radiofrequency method known as RP was first described in 1998 by Sluijter, *et al.* [Vigneri, S. *et al.*, 2014], and it has emerged as a valid alternative to electroconvulsive therapy for the treatment of chronic pain syndromes of the lumbar spine, including neuralgia syndromes. This particular radiofrequency technique does not appear to be neurodestructive [Chang, M. C. *et al.*, 2018]. The tissue is exposed not only to a specific temperature but also to an electromagnetic field, which subsequently exerts a biological effect at the intracellular level. The impetus for this technique was to achieve a more selective treatment, aiming to block C-fibers while preserving the integrity of thick myelinated fibers, thereby averting neuronal loss syndromes. RP can be regarded as a neuromodulator technique, as opposed to a neuroablation technique, in which the electrode temperature does not exceed 42 °C. This is accomplished by subjecting the nerve to a high-frequency electrical field of 45 volts for 20 milliseconds, followed by a 500-millisecond interval, with a 480-millisecond pause to allow for the dissipation of the heat generated during the active treatment cycle [Facchini, G. *et al.*, 2017].

Following a thorough bibliographic search, none of the reviews satisfied the rigorous inclusion criteria, thus precluding their inclusion in this review. The results of the present study are largely consistent with those of most published reviews, which synthesize the efficacy and safety of radiofrequency techniques in treating various disorders. [Shofwan, S. *et al.*, 2020] This finding is consistent with the studies conducted by Niemisto17, Smuk53, and Guo54, which evaluated



the radiofrequency techniques in different anatomical sites and employed a diverse array of studies exhibiting substantial heterogeneity. Mackenzie and Aydin examined the application of radiofrequency in pain treatment within the sacroiliac region, while Smuk and Kalsu's reviews assessed radiofrequency techniques as applied to the lumbar region, employing a range of study types. Manchikanti investigated radiofrequency in chest pain, and Levin considered trials of interventional techniques for chronic back pain. However, a systematic review of clinical trials investigating radiofrequency techniques for treating chronic back pain was not identified, although some trials discussed in this review have already been compiled and assessed in previous published reviews. [Lee, D. G. et al., 2016; Simopoulos, T. T. et al., 2008]

The results can be considered consistent with the methodology used without finding any controversies or complications from a bioethical point of view. In previous studies regarding the use of epidural steroids, the results were conflicting, with positive cases reporting an improvement of 40 to 60% and the result being short-lived<sup>5,9</sup>. Different techniques for applying epidural steroids have also been reported, which also affects the results<sup>9</sup>. The present study shows an improvement in pain of more than 60% in 12 cases in which epidural steroids were applied, which is consistent with previously published studies. Potential complications have also been reported with epidural steroids, ranging from dural sac rupture. With regard to the application of pulsed radiofrequency, short series have been published since its inception, including 20 to 25 patients<sup>10</sup>, and over time, series with a larger number of cases have been presented, although the majority are retrospective studies, or case series, in a number of 12 articles in the past 10 years, where the clinical results of improvement on average reached this improvement by 70 to 80%<sup>6-8</sup>. In the present study, the improvement with the application of pulsed radiofrequency was from a scale ranging from 7.5 to 4.5 on average, which means a reduction of 60%, which is less than reported in the literature. Where the results obtained are compared randomly, they find an improvement in pain and a functional scale similar to the control group. Possible reasons for poor outcomes in both groups, such as prolonged disability and patients with emotional disorders such as depression, were also compared, and we found the same proportion in both groups, which is consistent with similar

studies of the treatment of chronic low back pain, whether by surgical methods or non-surgical treatments. [Sluijter, M. E. et al., 2013]

## CONCLUSION

In this study, we conclude that the moral frequencies have an effective and significant impact on patients' pain and improving the quality of life, as a statistical significance was found with a P-value of 0.05, which indicates the existence of a direct relationship between the improvement of the general quality of life for patients with the use of the treatment. In addition, the side effects were slight after the operation, which illustrates the effective role it plays in treating Iraqi patients who suffer from LUMBAR RADICULAR PAIN.

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