Original Research Article

Comparison of the Dose of Oral Dexamethasone vs. Oral Prednisone in the Treatment of Acute Lumber Radicular Pain: A Cohort Study

Abstract

Objective: The main objective of this article is to compare the dose of oral dexamethasone 2mg vs oral prednisone 10 mg in terms of potency and efficacy in the treatment of acute lumbar radicular pain.

Methods: A cohort study was conducted on 50 patients who were sequentially assigned to receive 10-day course of oral dexamethasone (n=25) and 15 days' course of oral prednisone(n=25).

Results:

We concluded that oral dexamethasone and prednisone has same efficacy and showed same effect on NRS Scale but dexamethasone has less potency and shorter treatment course as compared to prednisone. Dexamethasone is superior over prednisone.

Conclusion: The study concluded that dexamethasone is superior over prednisone, and has better efficacy and safety profile so we should use 2mg/day of dexamethasone in treatment of acute lumbar radicular pain and oral route is easier route and avoids the risks associated with maintenance of intravenous access.

Key words: Oral dexamethasone, Oral Prednisolone, Lumbar radiculopathy,

Introduction

1. Worldwide cause of job loss is Lumber radicular pain (Holve and Barkan 2008; Owlia, et al., 2007; Deyo, 2006). Lumbar radiculopathy is a self-limited injury to the nerve roots of the lumbar spine. It can present as excruciating, burning, or stinging pain, radiating down the leg, decreased sensation of the legs, numbness and tingling, and in more severe cases, muscle weakness. Conventional treatment includes NSAIDS, analgesics or narcotic agents (Frymoyer, 1988; Bigos, 1994; Daniels 1997; Deyo, 1983; Griffin et al., 2002; Weber, 1994). Patients with unbearable pain or continuous severe symptoms usually receive an epidural steroids injections and if even they need decompressive laminectomy or discectomy (Kraemer, 1995; Jensen et al., 1994; Cho et al., 2010).

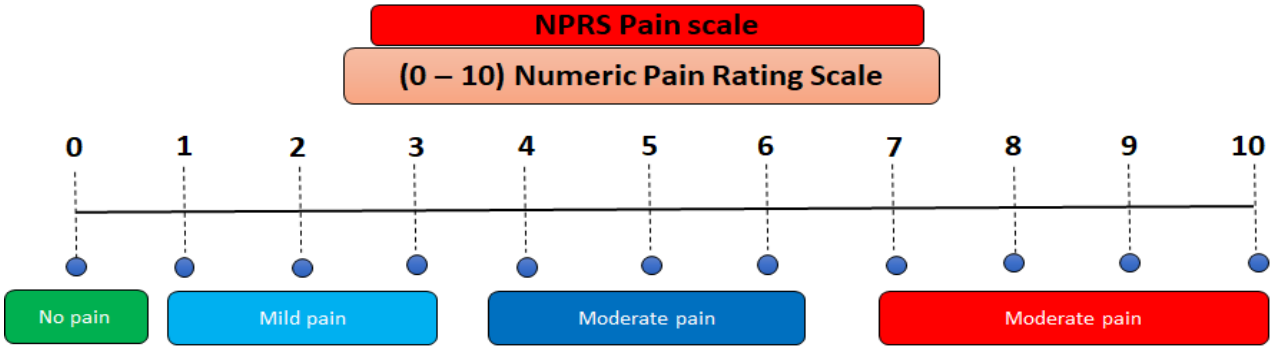
   Majority of patient withsciaticarecoversusuallywithin6-12weeks (Weber, 1994; Boden et al., 1990; Wiesel et al., 1984). But still this problem results in huge loss to our society mostly in term of productivity, disability, and treatment costs (Frymoyer, 1988 ;Guo et al., 1999; Ridley et al., 1988; Buchner et al., 2000; Carette et al., 1997; Watts and Silagy, 1995). Lumbar radiculopathy involves mechanical or inflammatory events that affect one or more than one lumbosacral nerve root mostly from herniated disk compression or also form inter relation between local inflammatory responses and neuro-humeral interaction between brain, spinal cord and nerve roots which is thought to be the most common cause of this radicular pain Owlia et al., 2007; Holve and Barkan, 2008). Tissue damage affect neuraxial system due to production of pro-inflammatory substance resulted in autoimmune response (Frymoyer, 1988 ;Guo et al., 1999; Manchikanti, 2002; Vroomen, 2000). Steroids have shown better efficacy in terms of reducing tissue damage through the mechanism of stabilizing cell membranes, reducing capillary permeability and limiting release of pro-inflammatory substances. As there is little

clinical evidence to support this practice to test efficacy and safety of oral steroids which are cost effective (Papageorgiou, 1995; Anderson, 1991; Holve and Barkan, 2008; Pettersson, 1998; Haimovic and Beresford, 1986; Rydevik et al., 1997). The main objective of this article is to compare the dose of oral dexamethasone 2mg vs oral prednisone 10 mg in terms of potency and efficacy in the treatment of acute lumber radicular pain.

2. Methods:

A cohort study was conducted on 50 patients sequentially assigned to receive 10 days of oral dexamethasone (n=25) and 15 day of oral prednisone (n=25). Follow up assessment was done after 10 and 15 days respectively. A questionnaire was designed to collect the relevant data from the patients containing demographic data, and data about severity of pain before and after using medication containing steroids.

Plate 1 : Numeric pain rating scale for determination of pain



Data collection

The data collection was done as per following Performa.

Chart 1 : Demographic data

Patient Name		
Gender	Male	Female
Age		
Profession		
Weight		
Allergy		

Chief complaints

1) Cervical pain with radiculopathy signs
2) Low back pain with radiculopathy signs
3) Other

Radiological findings if MRI done

1. **Stenosis**

a. Single level

b. Multiple level

2. **herniated disc**

a. single level

b. multiple level

c. Multiple degenerative changes

d. Others

Chart 2 : Pain scale (NRS) grades [0-10]

0	no pain
1-5	mild
6-7	moderate
8-10	severe

Chart 3 : Grades

0	1	2	3	4	5	6	7	8	9	10

Chart 4 : Disability scale (odi) grades [0-100]

0-20	minimal
21-40	moderate
41-60	severe
61-80	crippled
81-100	bed bound

Chart 5 : Grades

0	10	20	30	40	50	60	70	80	90	100

Chart 6: Duration of pain

<2 weeks	
2-6 weeks	
6wks-6months	
>6months	

Chart 7 : Treatment

Oral steroids	**dose**	**duration**
PO dexamethasone		
PO prednisolone		

Co-morbidities

1) Diabetes mellitis
2) Hypertension
3) Others

Other medicines

Chart 8 : Drug drug interaction
Physiotherapy

YES/NO	DURATION

Follow up visit
10-DAYS

15-DAYS

1-MONTH

Chart 9 : Pain improvement/NRS scale

0	1	2	3	4	5	6	7	8	9	10

Chart 10 : Functional improvement/odi scale

0	10	20	30	40	50	60	70	80	90	100

Pain relief with short dose steroid

1. Persistent
2. Transient
    a. Some relief afterward
    b. Same pain returned afterward

Data analysis

Comments and recommendations

Statistical analysis

The data is presented as mean and standard error of mean and was statistically analyzed through SPSS version 16 software tool to find out the significance of the data.

Results

Profession and Age

The questionnaire was circulated to the patients who were from different profession and age group as reflected in Figure 1.

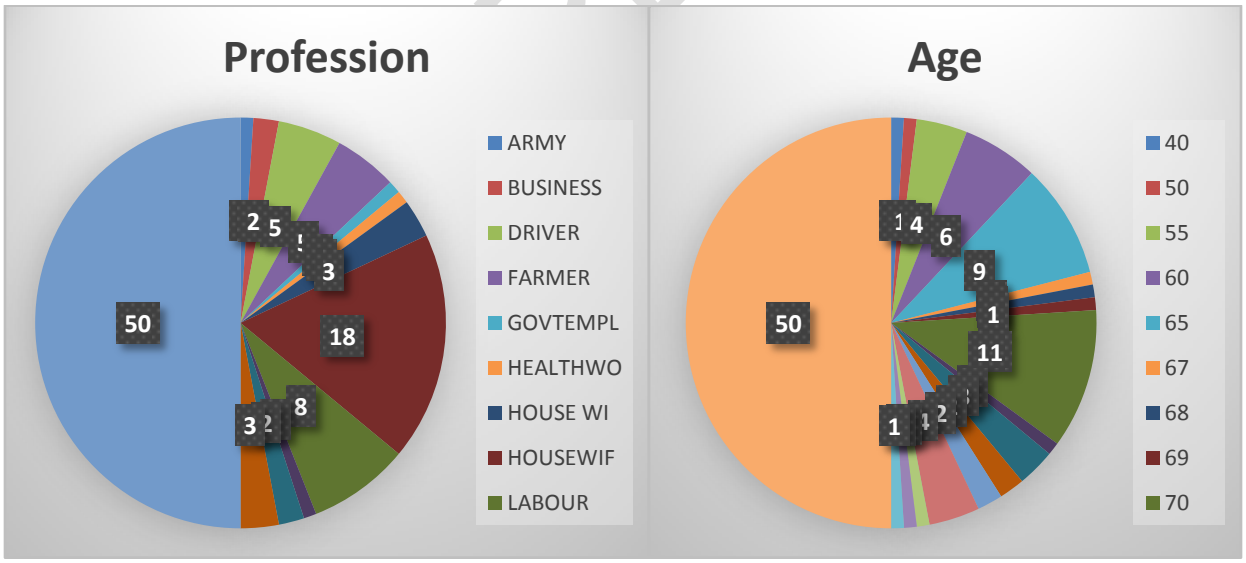


Figure 1. Represent profession and age of the participant involved in the study of lumber radicular pain.

Gender and Weight

The total number patient enrolled in the study were 50 suffering from lumber radicular pain. Among the assigned population 23 were female and 27 males were studied for the effect of oral steroids (Dexamethasone and Prednisolone). In addition, age limit of the selected patient was 40 to 75 as reflected din Figure 2.

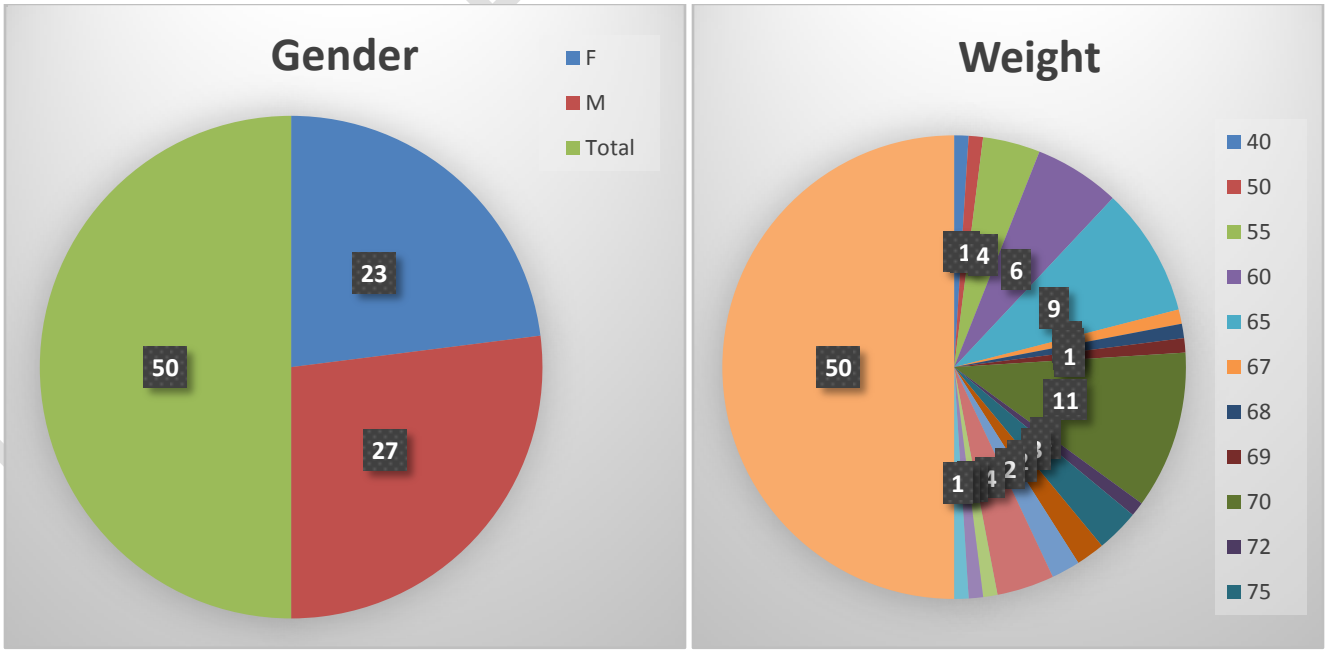
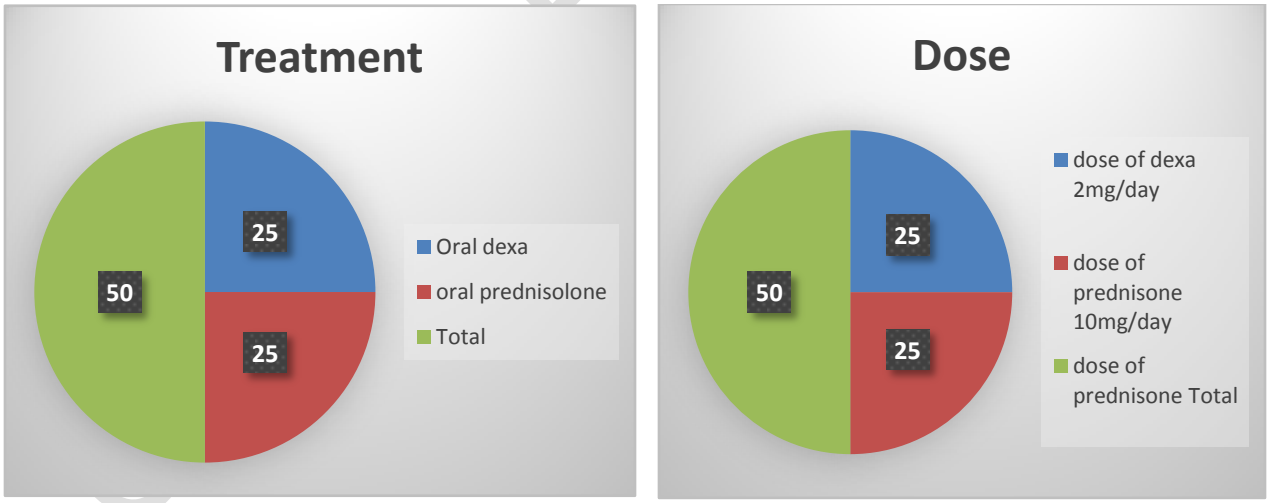


Figure 2. Represent Gender (M= 27, F= 23) and weight (40 – 75 Kg, Average weight= 70 Kg) of the participant involved in the study of lumber radicular pain.

Treatment and dose

The selected patients were subjected to oral steroids (Dexamethasone and Prednisolone) administration at a dose of 2mg/day and 10mg/day. The treatment with dexamethasone was continued for 10 days while the treatment with prednisolone was continued for 15 days as shown in Figure 3. The patient pain perception was noticed with pain scale as mentioned in the methodology.



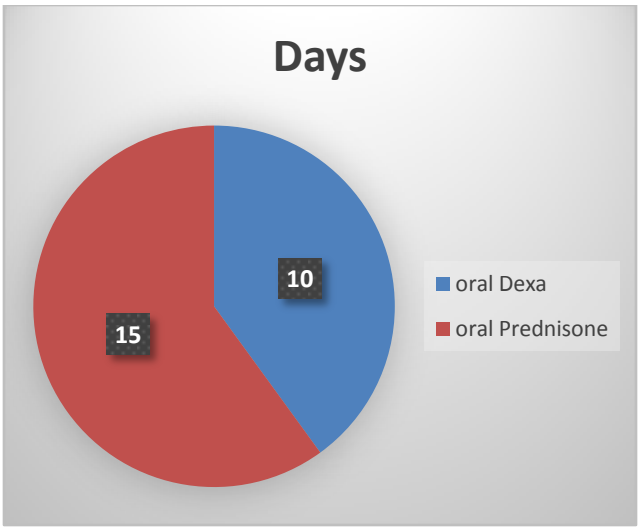


Figure 3. Represent Treatment (Dexamethasone = 25, Prednisolone = 25) with a dose of (Dexamethasone = 2 mg/day and Prednisolone = 10 mg/day,) administered to the participant (Dexamethasone = 10 days, Prednisolone = 15 days) involved in the study of lumber radicular pain.

Lumber radicular pain perception before treatment

Table 1 highlighting the pain perception of patient suffering from lumber radicular pain. The pain at this stage was statistically examined in the absence of any treatment with oral corticosteroids and it is shown that all 25 patients with a mean of 8.7200 and standard error of mean is 0.25508 in the absence of dexamethasone while 8.5200 and 0.23180 is the mean and SEM in the absence of treatment with prednisolone.

Table 1. Represent the statistical analysis of the enrolled patient for pain perception without any use of oral corticosteroids (dexamethasone and prednisolone). The data is analysis is carried out through SPSS version 16 software package

Treatment	N	Mean	Std.Deviation	Std. Error Mean
Oral dexamethasone	25	8.7200	1.27541	.25508
Oral prednisolone	25	8.5200	1.15902	.23180

Lumber radicular pain perception after treatment

Table 2 highlighting the pain perception of patient suffering from lumber radicular pain. The pain at this stage was statistically examined in the absence of any treatment with oral corticosteroids and it is shown that all 25 patients with a mean of 2.3600 and standard error of mean is 0.207 in the presence of dexamethasone while 2.2400 and 0.225 is the mean and SEM in the presence of treatment with prednisolone. Table 3 is the summary of the pain full symptoms before and after treatment.

Table 2. Represent the statistical analysis of the enrolled patient for pain perception after the use of oral corticosteroids, dexamethasone and prednisolone for 10 and 15 days respectively. The data is analysis is carried out through SPSS version 16 software package.

Treatment	N	Mean	Std.Deviation	Std. ErrorMean
Oral dexamethasone	25	2.3600	1.03602	.20720
Oral prednisolone	25	2.2400	1.12842	.22568

Table 3. Represent the summary of pain perception before and after treatment of steroids.

	Mean	N	Std.Deviation	Std. ErrorMean
Pain before	8.7200	25	1.27541	.25508
Pain after	2.3600	25	1.03602	.20720

Discussion

We have use the spss16 version as a statistical tool in which 50 is the sample population and 25 in each group i.e. 25 had given oral prednisone and 25 had given oral dexamethasone, the mean came out with pain before prednisone was 8.5200 with a confidence interval 95%, level of significance 5%, P value=0.564 and after giving oral prednisone with a dose of 10 mg/day and showed significant response on NRS scale with mean of 2.2400 with p value=0.697, confidence interval 95%, level of significance 5%. When we compared this with 2mg/day of dexamethasone for 10-day mean came out with pain before dexamethasone was 8.7200 with a confidence interval of 95%, level of significance 5%, P value=0.564 and after giving oral dexamethasone and showed significant response on NRS scale with mean of 2.3600 with p value=0.697, confidence interval 95%, level of significance 5%.

We have taken average mean of before and after using oral dexamethasone and combine mean came out as 5.541 while of oral prednisone before and after was 5.38 so we concluded that oral dexamethasone and prednisone have same efficacy and showed same effect on NRS Scale but dexamethasone has less potency and shorter treatment course as compared to prednisone dexamethasone is superior over prednisone.

Conclusion

From all of these observations and results, data collected we have concluded from patient sample size of 50 in which 25 had been given 2mg/day of dexamethasone (as tablets is 0.5mg and we have 2 tablets means1mg twice a day to our patient means 2 mg/day) while 25 remaining have dose of 10mg/day prednisone (tablet is of 5mg which was given twice daily so total of 10mg/day), while comparing these two found no difference at all that2mg of dexamethasone has equal effect as of 10mg of prednisone. There will be equal efficacy and no one has superiority over the other one but through statistical analysis, we have seen more effective results of dexamethasone 2mg in the treatment of acute lumber radicular pain. As we all know that steroids have more side effects and must not be used in diabetic patients or use with caution but when we compare the safety profile we have seen that dexamethasone is way more effective than prednisone. So we concluded that dexamethasone is superior to prednisone, and has better

efficacy and safety profile, so we should use 2mg/day of dexamethasone to treat acute lumbar radicular pain and oral route is easier route and avoids the risks associated with the maintenance of intravenous access.

References

1. Boden, S. D., Davis, D. O., Dina, T. S., & Patronas, N. J. (1990). Wiesel Sw. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects: A prospective investigation. *J. Bone and Joint Surg*, 403-408.

2. Wiesel, S. W., Tsourmas, N., Feffer, H. L., Citrin C. M., & Patronas N. (1984). A study of computer-assisted tomography: I. The incidence of positive CAT scans in an asymptomatic group of patients. *Spine*, *9*(6), 549-551.

3. Jensen, M. C., Brant-Zawadzki, M. N., Obuchowski, N., Modic, M. T., Malkasian, D., & Ross, J. S. (1994). Magnetic resonance imaging of the lumbar spine in people without back pain. *New England Journal of Medicine*, *331*(2), 69-73.

4. Cho, S. C., Ferrante, M. A., Levin, K. H., Harmon, R. L., & So, Y. T. (2010). Utility of

electrodiagnostic testing in evaluating patients with lumbosacral radiculopathy: An evidence- based review. *Muscle & nerve*, *42*(2),276-282

5. Owlia, M. B., Salimzadeh, A., Alishiri, G. H., & Haghighi, A. (2007). Comparison of two doses of corticosteroid in epidural steroid injection for lumbar radicular pain. *Singapore medical journal*, *48*(3), 241.

6. Deyo, R. A., Mirza, S. K., & Martin, B. I. (2006). Back pain prevalence and visit rates: estimates from US national surveys, 2002. *Spine*, *31*(23), 2724-2727.

7. Papageorgiou, A. C. (1995). Papageorgiou AC, Croft PR, Ferry S, Jayson MI, Silman AJ Estimating the prevalence of low back pain in the general populationEvidence from the South Manchester Back Pain Survey. *Spine (Phila Pa 1976)*, *20*(17), 1889-94.

8. Anderson, G. B. J. (1991). The epidemiology of spinal disorders. *The adult spine. Principles and practice*.

9. Frymoyer, J. W. (1988). Back pain and sciatica. *New England Journal of Medicine*, *318*(5), 291-300.

10. Bigos, S. J. (1994). Acute low back problems in adults. Clinical practice guideline No 14. *Agency for Health Care Policy and Research, Public Health Service*.

11. Daniels 2nd, J. M. (1997). Treatment of occupationally acquired low back pain. *American Family Physician*, *55*(2), 587-96.

12. Deyo, R. A. (1983). Conservative therapy for low back pain: distinguishing useful from useless therapy. *Jama*, *250*(8), 1057.

13. Griffin, G., Tudiver, F., & Grant, W. D. (2002). Do NSAIDs help in acute or chronic low

back pain?. *American Family Physician*, *65*(7), 1319-1322.

14. Weber, H. (1994). The natural history of disc herniation and the influence of intervention. *Spine*, *19*(19), 2234-8.

15. Kraemer, J. (1995). Natural course and prognosis of intervertebral disc diseases. International Society for the Study of the Lumbar Spine Seattle, Washington, June 1994. *Spine*, *20*(6), 635-639..

16. Guo, H. R., Tanaka, S., Halperin, W. E., & Cameron, L. L. (1999). Back pain prevalence in US industry and estimates of lost workdays. *American journal of public health*, *89*(7), 1029-1035.

17. Manchikanti, L. (2002). Role of neuraxial steroids in interventional pain management. *Pain physician*, *5*(2), 182.

18. Vroomen, P. C., de Krom, M. C., Slofstra, P. D., & Knottnerus, J. A. (2000). Conservative treatment of sciatica: a systematic review. *Clinical Spine Surgery*, *13*(6), 463-469.

19. Holve, R. L., & Barkan, H. (2008). Oral steroids in initial treatment of acute sciatica. *The Journal of the American Board of Family Medicine*, *21*(5), 469-474.

20. Pettersson, K., & Toolanen, G. (1998). High-dose methylprednisolone prevents extensive sick leave after whiplash injury: a prospective, randomized, double-blind study. *Spine*, *23*(9), 984-989.

21. Haimovic, I. C., & Beresford, H. R. (1986). Dexamethasone is not superior to placebo for treating lumbosacral radicular pain. *Neurology*, *36*(12), 1593-1593.

22. Rydevik, B. L., Cohen, D. B., & Kostuik, J. P. (1997). Spine epidural steroids for patients with lumbar spinal stenosis. *Spine*, *22*(19), 2314-2317.

23. Ridley, M. G., KINGSLEY, G. H., Gibson, T., & Grahame, R. (1988). Outpatient lumbar epidural corticosteroid injection in the management of sciatica. *Rheumatology*, *27*(4), 295-299.

24. Buchner, M., Zeifang, F., Brocai, D. R., & Schiltenwolf, M. (2000). Epidural corticosteroid injection in the conservative management of sciatica. *Clinical Orthopaedics and Related Research®*, *375*, 149-156.

25. Carette, S., Leclaire, R., Marcoux, S., Morin, F., Blaise, G. A., St.-Pierre, A., ... & Blanchette, C. (1997). Epidural corticosteroid injections for sciatica due to herniated nucleus pulposus. *New England Journal of Medicine*, *336*(23), 1634-1640.

26. Watts RW, Silagy CA. Ameta-analysis on the efficacy of epidural corticosteroids in the treatment of sciatica Anaesth Intensive Care 1995;23:564–9.

27. Owlia, M. B., Salimzadeh, A., Alishiri, G. H., & Haghighi, A. (2007). Comparison of two doses of corticosteroid in epidural steroid injection for lumbar radicular pain. *Singapore medical journal*, *48*(3).