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Original Research Article

A study on the effect of conservative management for lumbosacral radicuopathy on pain, disability and electrophysiological parameters in a tertiary health care centre

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ABSTRACT

Introduction: There are many causes for low back ache. One of these causes is lumbosacral radiculopathy. Here the pain is usually a low back ache which is radiating in the distribution of the corresponding root. The sensory symptoms will be in a dermatomal distribution and the motor weakness will be in a myotomal distribution. The main electrophysiological parameters which can be used are tibial H reflex , tibial and peroneal F waves and EMG. The treatment options are conservative management with drugs and exercise, invasive procedures like epidural steroid injection and surgical interventions.
Objectives: To find out the percentage of people with lumbosacral radiculopathy getting improvement in their pain symptom , disability status and electrophysiological parameters with the conservative management in a follow up period of 6 months.
Material and Methods: Study design: It is a prospective experimental (interventional) study with pre/post design
Study population: Patients with age between 18yrs and 80 years with radicular pain from the lower back in the lumbosacral distribution
Sample size: 76
Sampling procedure: Random sampling of patients fulfilling inclusion and exclusion criteria
Study procedure: Direct examination, history with nerve conduction and EMG studies and questionnaire with follow up at the end of 3and 6 months
Analysis: Data analysis was carried out using IBM SPSS software V 25. Disability score, compound muscle action potential score and f waves were assessed and compared using paired t test. A p value <0.05 was taken as the threshold for statistical significance.
Results: Considering the pain, 78.9% of the patients got improvement at the end of 3 months and 65.8% of the patients got improvement at the end of 6 months, with the conservative management. Considering the disability, 100% of the patients got improvement at the end of 3 months and 98.7% of the patients got improvement at the end of 6 months. The proportion of the patients who got improvement in the Tibial F wave latency with the application of conservative management was 44.7% at the end of 3 months and 48.7% at the end of 6 months. The proportion of the patients who got improvement in the Peroneal F wave latency with the application of conservative management was 52.6% at the end of 3 months and 51.3% at the end of 6 months. The proportion of the patients who got improvement in the H reflex latency with the application of conservative management was 51.3% at the end of 3 months and 48.

1. Introduction

Low back ache is a common symptom in the clinical practice. The lifetime prevalence of low back pain in worldwide basis estimates to be varied from 50% to 84%.[1]

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The occurrence of low back ache in India is very high. It is estimated that around 60% of the people have suffered from the low back ache at some time or the other during their life.[2]

There are many causes for low back ache. One of the important entity is lumbosacral radiculopathy. This is the involvement of the lumbosacral nerve roots by different disease processes. There are many etiologies. But the important ones are the intervertebral disk prolapse in younger population and spondylotic changes of the disc in the elderly population.[3]

The main nerve conduction study parameters which can be used in the evaluation of the patients suspected to have the lumbosacral radiculopathy usually involve the parameters which test the proximal segments of the nerve. They are called the late responses. The important late responses are the F waves and the H reflexes. Another important electrophysiological test which is useful in evalauting the patients with lumbosacral radiculopathy include the electromyogram (EMG). The EMG of the muscles in the corresponding dermatome including the paraspinal

muscles may show denervative changes in radiculopathy. The treatment may be conservative or surgical. The conservative management include the use of NSAIDs and other anti inflammatory medications, skeletal muscle relaxants, agents against neuropathic pain. The other modality used in the conservative treatment include physical therapy including the back strengthening exercises.[4]

The minimally invasive interventions are epidural steroid injections. There are multiple surgical options for the herniated disc. But the most commonly done procedure nowadays are microdiscectomy.[4]

2. Materials and Methods

2.1. Patients and setting

It is a prospective experimental (interventional) case series study which is included under the broad division of the experimental non randomized study with pre/post design.[5] The sample size was 76. Study was conducted for one and a half year (including the 6 months follow up), after obtaining institutional ethical committee clearance. The study period was from 2017 April to 2018 September. It was done i n the departments of Neurology and Physical Medicine and Rehabilitation, Govt.T.D Medical college hospital, Alappuzha among the patients with features to suggest the lumbosacral radiculopathy who were attending the outpatient unit or admitted in the departments of neurology and physical medicine and rehabilitation during the study period.

Inclusion criteria

1. Age between 18yrs and 80 years.

2. Radicular pain from the lower back in the lumbosacral distribution with orwithout sensory impairment in the dermatomal distribution and motor impairment in the myotomal distribution of any duration.

Exclusion criteria

Following patients are excluded from the study

1. Patient refusal for undergoing conservative management.
2. Patients with diabetes mellitus
3. Pregnant and lactating mothers
4. Patients with coronary artery disease
5. Patients with drug allergies
6. Patients with etiologies for lumbosacral radiculopathies other thandegenerative spine disorders like the suspected or provencases of tumours, infections, fracture, bony abnormalities or paraneoplastic causes or the patients with indications for surgery for their symptoms.

2.2. Data collection tool

For pain: 0 to 10 numerical pain scale

For disability: Oswestry disability questionnaire

For nerve conduction study and EMG: The electromyogram and nerve conduction study machine in the department of neurology, Govt TD Medical College, Alappuzha

2.3. Sampling procedure and study procedure

All the selected patients were given adequate rest (not complete immobilization). They were also given the protocol based conservative treatment with tricyclic anti depressant, and skeletal muscle relaxants. It was given to all patients. In the initial period, the patients with intolerable pain were given 3 days of intravenous steroids (Methyl prednisolone 10 mg/ kg daily for 3 to 5 days) and NSAIDs for acute pain relief. The TCA given was amitriptyline at the dose of 10 mg single dose at night time. The dose was adjusted according to the symptoms. Some patients needed higher dose on follow up. The maximum dose given was 50 mg per day. The skeletal muscle relaxant given was benzodiazepine diazepam which was started at as a single night time dose of 5 mg. This was not increased in any patient. But after one month, it was decreased to 2.5 mg at bed time according to the institute protocol and continued till the end of the followup. After a period of four weeks of adequate rest, the patients were started on rehabilitative physical medicine treatment which was monitored and modulated by the qualified physiatrist of our institute. This regimen contained William's back strengthening exercise. They were reassessed at the end of 3 months from the start of the medical treatment and again at the end of 6 months from the start of the medical treatment with the same measures used previously.

2.4. Statistical analysis

Data analysis was carried out using IBM SPSS software V 25. A p value <0.05 was taken as the threshold for statistical significance.

2.5. Normal values of electrophysiological parameters in our institute

Minimum tibial F wave latency: Less than 57milli seconds (ms)

Minimum peroneal F wave latency: Less than 57milli seconds (ms)

Minimum tibial H reflex latency: Less than 34milli seconds (ms)

Inter-limb tibial H reflex latency difference: Less than 1.5milli seconds (ms)

3. RESULTS

3.1. Demographic data

A total of 76 patients with clinical features of lumbosacral radiculopathy were included in the study. Of the 76 individuals, 44 (57.9%) were males and the rest were females.

3.2. Patient characteristics

The predominant symptom was present in the right lower limb for 40 patients and in the left lower limb for the rest of the 36 patients. Bilateral and equal symptom was not there in any of the enrolled patients. 47 patients had duration of symptom more than 6 weeks and the rest had symptoms of less than 6 weeks duration. Motor deficit was present in only 23.7% of the patients. The toe extensorsinvolved in 14 patients. Toeflexors in 9 patients. Ankle dorsiflexion affected in 10 patients. Ankle plantar flexion affected in 7 patients. Inversion weakness in 7 patients, eversion weakness in 7 patients and the hip abduction affected in 9 patients. Sensory deficit was present in 68.4% of the patients. In all of them, it was in the dermatomal distribution of the fifth lumbar and the first sacral roots. Stright leg raise positivity was present in 50% of the patients. All these patients had positivity between 30 to 60 degree of leg raise.

Out of 76 patients, the ankle jerk was completely absent on the affected side in 41 patients. It was absent bilaterally in 5 patients. Out of the patients with predominantly S1 root involvement, the ankle jerk was absent on the affected side i n 11 out of 12 patients. In the remaining one patient, it was absent bilaterally.

Out of the patients who had predominant involvement of the L5 root, It was absent in the affected side in 8 out of 32 patients. It was absent bilaterally in 2 out of this 32. In the group of patients with involvement of both L5 and S1 radicular involvement, it was absent in the affected side in 22 out of 32 patients. It was absent bilaterally in 2 patients.

3.3. Pain scoring

Pain score was assessed using 0-10 numerical pain scale system. The baseline median value was 6 out of 10. It was improved to 4 after 3 months follow up period and later slightly increased to 5 after 6 month period. The values were compared using Wilcoxon signed rank test. It was found to be of significant change at the end of first and second follow up compared to the baseline level. The deterioration of score at the second follow up was also in significant amount compared to the first follow up.

Table 1:

Wilcoxon signed rank test	Baseline VS 3 months	Baseline VS 6 months	3 months VS 6 months
Z	-7.218	6.414	3.618
P	<0.001	<0.001	<0.001

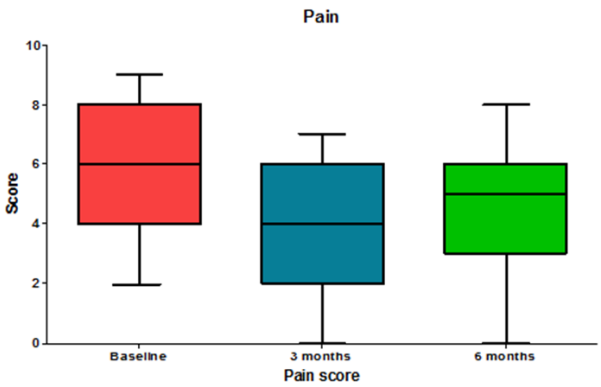

Fig. 1: Wilcoxon signed rank test for pain score assessment

3.4. Disability scoring

Disability score was assessed using Oswestry disability scoring system. The baseline mean value was 54.39%. It was improved to 36.38% after 3 months follow up period and later slightly increased to 43.21% after 6 month period. The values were compared using paired t test. It was found to be of significant change at the end of first and second follow up compared to the baseline level. The deterioration of score at the second follow up was also in significant amount compared to the first follow up.

3.5. Electrophysiological parameters

Tibialf wave latency was assessed using nerve conduction study. The baseline mean value was 54.19 milliseconds (ms). It was decreased to 53.71 ms after 3 months follow up period and again decreased to 52.30 ms after 6 month period. Peroneal F wave latency was assessed using nerve conduction study. The baseline mean value was 54.14ms. It

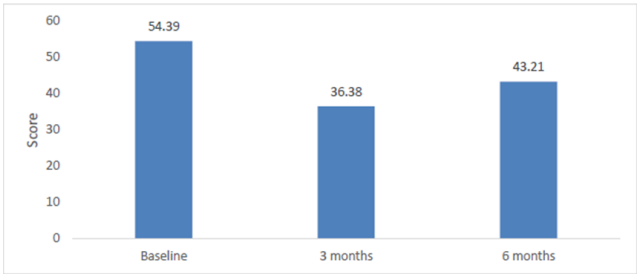

Fig. 2: Disability score assessment on follow up

was increased to 54.60 ms after 3 months follow up period and later decreased to 53.87 ms after 6 month period. Tibial H Reflex latency was assessed using nerve conduction study. Out o the total 76 patients, H reflex could not be elicited from 16 on the side in which they had symptoms. But on the opposite side, it was recorded in all of them. So the H reflex values are calculated in the 60 patients in which it was recordable bilaterally. On the side wise analysis, it was absent on 8 patients with right and 8 another 8 patients with left sided symptoms. The baseline mean value was 36.51 ms for 60 patients in which it was recordable. For these analysis, the H reflex on the affected side was only taken. It was decreased to 36.37 ms after 3 months follow up period and later increased to 36.42 ms after 6 month period. The difference between the H Reflex latency of the abnormal and the normal side was also calculated. It was only possible in those 60 patients in whom the H reflex was elicited bilaterally. In those 60 patients, the baseline mean value was 2.07ms. It was increased to 2.11ms after 3 months follow up period and again increased to 2.19 ms after 6 month period. Electromyogram of the respective muscles were done in only 17 patients out of the total 76 as the consent for this invasive test was not obtained from others. Of these 89.5% showed no spontaneous activity. 10.5% showed spontaneous activity in the form of fibrillation and positive sharp waves.

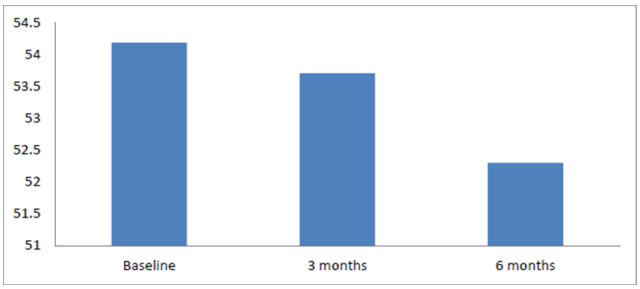

Fig. 3: Tibial F wave latency on follow up

4. Discussion

The mean age of the study population was 56.61 years. The youngest patient enrolled in the study was of 39 years of

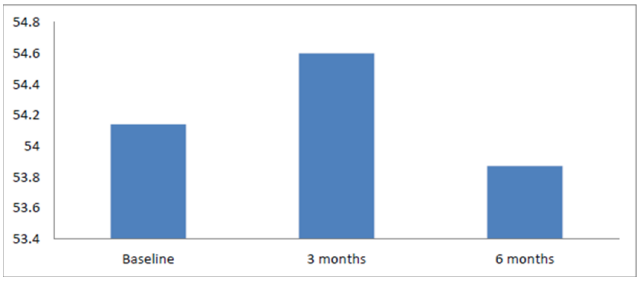

Fig. 4: Peroneal F wave latency on follow up

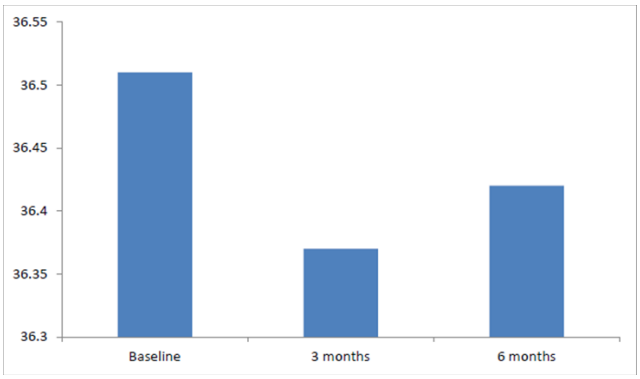

Fig. 5: Tibial H reflex minimum latency on follow up

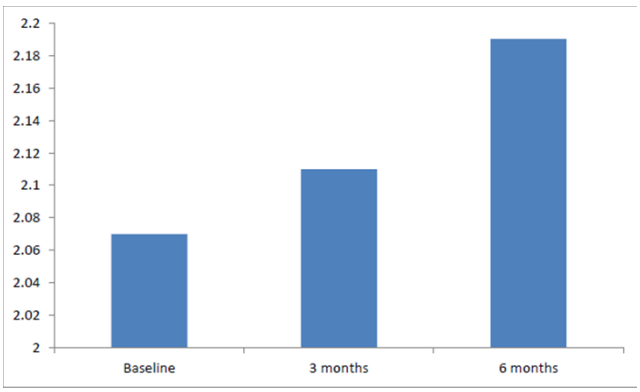

Fig. 6: Inter limb difference of the Tibial H reflex latency on follow up

age and the oldest patient was of 78 years of age. The male female ratio was 1.37. All the patients who were found to be the eligible candidates of our study were having the symptoms suggestive of L5 and S1 radiculopathy. The involvement of the other roots were there in the patients who failed to satisfy the exclusion criteria due to other unrelated co-morbidities. This may be of almost the similar findings in the other studies were it was noted that almost 95% of the patients coming with lower limb radiculopathies were having L5,S1 radiculopathy.[6] Motor deficits were found in 23.7% of the patients. The weakness involved the following muscle groups. The toe extensors involved in 14 patients.

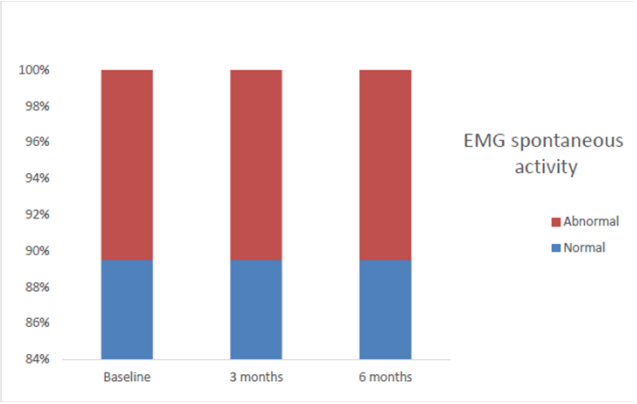

Fig. 7: Electromyogram (EMG) spontaneous activity on follow up

Toe flexors in 9 patients. Ankle dorsiflexion affected in 10 patients. Ankle plantar flexion affected in 7 patients. Inversion weakness in 7 patients, evertion weakness in 7 patients and the hip abduction affected in 9 patients. But all of them were able to do all the activities as it was only mild weakness. Sensory deficit was found in still higher percentage of patients. It was there in 68.4% of the patients. Most of these patients had objective evidence of dulling of the pain and touch sensations in the L5 and S1 dermatomes. This was also a similar finding in the earlier studies where they also found that sensory deficits outnumber the motor deficit. 6 Out of the 76 patients, 47 patients had duration of symptom more than 6 weeks and the rest had symptoms of less than 6 weeks duration. Straight leg raising test was done in all patients. It was considered as positive if the patient experiences the symptoms between the 30 and 60 degrees of the leg raise from the horizontal plane. It was found to be positive only in 50% of the cases in our study. This was not like that seen in other study were they found that the positivity of SLR in the L5 radiculopathy was approaching 90% 6. Out of 76 patients, the ankle jerk was completely absent on the affected side in 41 patients. It was absent bilaterally in 5 patients. Out of the patients with predominantly S1 root involvement, the ankle jerk was absent on the affected side in 11 out of 12 patients. In the remaining one patient, it was absent bilaterally. Out of the patients who had predominant involvement of the L5 root, It was absent in the affected side in 8 out of 32 patients. It was absent bilaterally in 2 out of this 32. In the group of patients with involvement of both L5 and S1 radicular involvement, it was absent in the affected side in 22 out of 32 patients. It was absent bilaterally in 2 patients. So it can be noted from our study that the ankle jerk is absent in 100% of the patients with predominant involvement of the S1 root (out of this, one patient showed absent ankle jerk bilaterally). The patients in which the predominant involvement is on the L5 radiculopathy, the ankle jerk is absent only in 31.25% on the affected side. Even in this 31.25%, about 6.25% of the cases, it was affected bilaterally. In the patients with mixed radiculopathies, it was affected in 75% (bilaterally in 6.25% of this). In different studies, it was seen that the predictability of lumbar disc herniation causing S1 radiculopathy by the ankle reflex approaches 90% in young age. But in older age, it is around 50% only 81. In our study the relationship of the age with the absence of the ankle jerk not taken care off. But our study showed that, in the patients with the symptoms suggestive of S1 radiculopathy, the ankle jerk was absent in 1.82% (combining pure S1 and mixed L5, S1 radiculopathy). It was unilateral loss in 75% and bilateral in the rest 6.82%. This value lies in the intermediate range of these values obtained in that study 7. In our study, it was noted that the patients who had the symptoms suggestive of involvement of the S1 root had more number of absence in the ankle jerk compared to the patients with symptoms suggestive of L5 radiculopathy. In pure S1 radiculopathy it reached 100% and in pure L5 radiculopathy, it was only 31.25%. It was very obvious and concordant with other studies because the root value of the ankle reflex involves S1 root rather than L5 root.[3]

81.82% (combining pure S1 and mixed L5, S1 radiculopathy). It was unilateral loss in 75% and bilateral in the rest 6.82%. This value lies in the intermediate range of these values obtained in that study.[7] In our study, it was noted that the patients who had the symptoms suggestive of involvement of the S1 root had more number of absence in the ankle jerk compared to the patients with symptoms suggestive of L5 radiculopathy. In pure S1 radiculopathy it reached 100% and in pure L5 radiculopathy, it was only 31.25%. It was very obvious and concordant with other studies because the root value of the ankle reflex involves S1 root rather than L5 root.[3]

4.1. The Pain Symptom

The baseline median value was 6 out of 10. It was improved to 4 after 3 months follow up period and late slightly increased to 5 after 6 month period. This shows that there was significant improvement in the pain symptom with the conservative treatment. It was present in very early as third month of initiation of therapy. It was persisting in the shortter follow up of 6 months also in significant amount even though the pai was increasing in these patients over time. In our study 78.9% of the patients got imrovement in the pain score at the end of 3 months from the base line and no one got eteriorated. Even after 6 months of follow up, 65.8% had improvement from the base line value. But by this time, 5.3% had increase in the pain from the base line. This was different from other studies where it was found out that around 95% of the patients were getting improvement with the conservative treatment in radiculopathy even at the end of 6 months follow up.[8]

4.2. The Disability Measurements

The baseline mean value was 54.39%. It was improved to 36.38% after 3 months follow up period and later increased to 43.21% after 6 month period. This shows that there was significant improvement in the pain symptom with the conservative treatment. In our study 100% of the patients got improvement in the pain score at the end of 3 months from the base line. Even after 6 months of follow up, 98.7% had improvement from the base line value and none had deterioration. This was similar to other studies where it was found out that around 95% of the patients were getting improvement with the conservative treatment in radiculopathy even at the end of 6 months follow up.[8]

5. The Electrophysiological Parameters

We could get the F waves in both sides in both tibial and peroneal nerves in all patients even though the latency varied markedly. But after searching the literature, it was found that this type of finding can be seen in at least some studies done in patients with lumbosacral radiculopathies.[9] Tibial F wave latency was assessed using nerve conduction study. The baseline mean value was 54.19 ms. It was decreased to 53.71ms after 3 months follow up period and again decreased to 52.30 ms after 6 month period. No significant change at the end of first and second follow up compared to the baseline level. The change of value at the second follow up was also not significant compared to the first follow up. In our study 44.7% of the patients got improvement in the Tibial F wave latency at the end of 3 months from the base line. But 55.3% had deterioration. After 6 months of follow up, 48.7% had improvement from the base line value and 51.3% had deterioration.

Peroneal F wave latency was assessed using nerve conduction study. The baseline mean value was 54.14 ms. It was increased to 54.60 ms after 3 months follow up period and later decreased to 53.87 ms after 6 month period. There was no significant change at the end of first and second follow up compared to the baseline level. The change of value at the second follow up was also not significant compared to the first follow up. In our study 52.6% of the patients got improvement in the peroneal F wave latency at the end of 3 months from the base line. But 47.4% had deterioration. After 6 months of follow up, 51.3% had improvement from the base line value and 48.7% had deterioration. All these values also did not show any significance in their change. So in our study, the F wave characteristics did not change significantly even after the conservative treatment.

Tibial H reflex latency was assessed using nerve conduction study. Out of the total 76 patients, H reflex could not be elicited from 16 on the side in which they had symptoms. But on the contralateral side, it was recorded in all of them. So the H reflex values are calculated in the 60 patients in which it was recordable bilaterally. In our study, H reflex could not be elicited in 21% of the patients. It was lesser compared to the previous studies in which H reflex was not elicitable on the affected side in around 60 percentage of patients with S1 radiculopathy 10. The baseline mean value was 36.51ms in the 60 patients in which it was recordable on the affected side. The latency of H reflex on the affected side alone was taken for calculation. It was decreased to 36.37 ms after 3 months follow up period but later increased to 36.42 ms after 6 month period. In the 60 patients, 51.3% of the patients got improvement in the Tibial H reflex latency at the end of 3 months from the base line. But 48.7% had deterioration. After 6 months of follow up, 48.7% had improvement from the base line value and 51.3% had deterioration. No significant change at the end of first and second follow up compared to the baseline level. Inter-limb Tibial H reflex latency difference was also assessed. It was calculated as the difference in the H wave latency of the affected limb and the non affected limb. As there was no H reflex recordable in the affected limb of 16 out of 76 patients, it was calculated from the rest of the 60 patients. The baseline mean value was 2.07ms. It was increased to 2.11 ms after 3 months follow up period and again increased to 2.19 ms after 6 month period. No significant change at the end of first and second follow up compared to the baseline level. The change of value at the second follow up was also not significant compared to the first follow up. In our study 44.7% of the patients got improvement in the inter-limb Tibial H reflex latency difference at the end of 3 months from the base line. But same 44.7% had deterioration. Rest had no change. After 6 months of follow up, 46.1% had improvement from the base line value and 42.1% had deterioration. Rest of the patients did not show any change. In other studies, when the H reflex of both sides are present, the interlimb Tibial H reflex latency difference was considered as a good indicator for the diagnosis of S1 radiculopathy even though it has less validity than amplitude ratio.[10]

Electromyogram (EMG) of the respective muscles were done in only 17 patients out of the total 76 as the consent for this invasive test was not obtained from the o ther patients. We used tibialis anterior and tibialis posterior for L5 radiculopathy and medial and lateral gastronemius for S1 radiculopathy along with corresponding paraspinals.[11] Of these 17 patients, 89.5% showed no spontaneous activity. 10.5% showed spontaneous activity in the form of fibrillation and positive sharp waves. All these showed in paraspinal muscles for L5 radiculopathy patients. It was corresponding to the other studies also were it was found that the paraspinal muscles were the most likely to be abnormal.[11] Similar results were got for the side of the symptom and the duration of the symptom. All these means were not showing any statistically significant difference in any of the parameters at the base line or at the end of the

6 months. So it was shown in our study that the changes in the means of the pain, disability and the electrophysiological parameters were not significantly different for the different subgroups like the males or females, symptoms in the left or right side and the duration less than or more than 6 months. This was similar to the findings obtained in the other studies which also clearly showed that the gender, side of the symptoms or the duration of the symptoms do not affect the final result of the conservative management on the lumbosacral radiculopathy in a short term period of follow up. [12]

6. Conclusion

"It is concluded that, only the pain and the disability measures showed statistically significant improvement with the conservative management in the followup period of 6 months. The measured electrophysiological parameters like Tibial F wave latency, Peroneal F wave latency, Tibial H reflex latency, Inter limb tibial H reflex latency difference and the EMG spontaneous activity did not show any statistically significant improvement after the application of the conservative management, at the end of both the third and the sixth months."

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8. Source of funding

None

9. Conflict of interest

None

References

1. Badley EM, Rasooly I, Webster GK. Relative importance of musculoskeletal disorders as a cause of chronic health problems, disability, and health care utilization- Findings from the 1990 Ontario Health Survey. *J Rheumatol*. 2010;2:505–514.
2. Koley S, Sandhu NS. An association of body composition components with the menopausal status of patients with low back pain in Taran. *J Life Sci*. 2009;1:129–132.
3. Tarulli AW, Raynor EM. Lumbosacral radiculopathy. *Neurol Clin*. 2007;25(2):387–405.
4. Sabnis AB, Diwan AD. The timing of surgery in lumbar disc prolapse: A systematic review. *Indian J Orthop*. 2014;48(2):127–135.
5. Curry JI, Reeves B, Stringer MD. Randomized controlled trials in pediatric surgery: could we do better? *J Pediatric Surg*. 2003;38(4):556–559.
6. Kleining TJ, Brophy BP, Maher CG. Back and leg weakness. *MJA*. 2011;195:454–457.
7. Bowditch MG, Sanderson P, Livesey JP. The significance of An Absent Ankle Reflex. *J Bone Joint Surg*. 1996;(2):276–279.
8. Saal JA, Saal JS. Nonoperative treatment of herniated lumbar intervertebral disc with radiculopathy. An outcome study ; 1989,.
9. Toyokura M, Murakami K. F wave study in patients with lumbosacral radiculopathies. *Electromyogr Clin Neurophysiol*. 1997;37(1):19–26.
10. Nishida T, Kompoliti A, Janssen I. H reflex in S-1 radiculopathy :latency versus amplitude controversy revisited. *Muscle & Nerve*. 1996;p. 915–917.
11. Barr K. Electrodiagnosis of lumbar radiculopathy. *Phys Med Rehabil Clin N Am*. 2013;24(1):79–91.
12. Kavuncu V, Kerman M, Sahin S, Yilmaz N. The outcome of the patients with lumbar disc radiculopathy treated either with surgical or conservative methods. *Pain Clinic*. 2002;13(3):193–201.

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