Section: Orthopaedics

Systematic Review

A COMPARATIVE STUDY OF FUNCTIONAL OUTCOME IN PATIENTS WITH LATERAL EPICONDYLITIS TREATED BY DRY NEEDLING OR INTRALESIONAL CORTICOSTEROID INJECTION

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Received : 16/05/2026
Received in revised form : 20/06/2026
Accepted : 04/07/2026

Keywords:
Lateral epicondylitis, Tennis elbow, Dry needling, Corticosteroid injection, Visual Analogue Scale, PRTEE, Pain, Functional outcome.

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DOI: 10.47009/jamp.2026.8.4.51

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (4); 282-288

ABSTRACT

Background: Lateral epicondylitis (tennis elbow) is one of the most common overuse disorders of the upper limb and is characterized by pain and functional limitation. Although most patients respond to conservative treatment, refractory cases often require interventions such as corticosteroid injection or dry needling. This study compared the clinical efficacy and safety of dry needling and corticosteroid injection in the management of lateral epicondylitis. **Materials and Methods:** This prospective cohort study included 130 patients with clinically diagnosed lateral epicondylitis treated at the Department of Orthopaedics, Integral Institute of Medical Sciences and Research (IIMSR), Lucknow, between September 2022 and March 2024. Patients were allocated alternately into two groups: Group A (corticosteroid injection; n=65) and Group B (dry needling; n=65). Pain and functional outcomes were assessed using the Visual Analogue Scale (VAS) and Patient-Rated Tennis Elbow Evaluation (PRTEE) score at baseline and at 3, 6, 12, and 24 weeks after intervention. Adverse events were also recorded. Statistical analysis was performed using SPSS version 25, with $p \leq 0.05$ considered statistically significant. **Result:** Baseline demographic and clinical characteristics were comparable between the two groups ($p>0.05$). Both interventions produced significant improvements in pain and function during follow-up. Mean VAS scores at 24 weeks were 1.69±1.32 in Group A and 2.25±1.24 in Group B ($p=0.015$), with an overall reduction of 4.77±1.44 and 4.25±1.28, respectively ($p=0.030$). Mean PRTEE scores at 24 weeks were 10.38±2.19 in Group A and 12.09±3.18 in Group B ($p=0.001$). Overall improvement in PRTEE scores was comparable between groups (55.37±6.25 vs. 54.97±6.93; $p=0.730$). Adverse effects occurred in 1.5% of patients in Group A and 7.7% in Group B, although this difference was not statistically significant ($p=0.095$). **Conclusion:** Both corticosteroid injection and dry needling were effective in reducing pain and improving function in patients with lateral epicondylitis. While corticosteroid injection demonstrated significantly greater pain relief during follow-up, functional improvement at 24 weeks was comparable between the two groups. Both procedures were associated with low complication rates. Larger randomized studies with longer follow-up are recommended to further establish the comparative long-term efficacy and safety of these treatment modalities.

INTRODUCTION

Lateral epidcondylitis (LE), commonly referred to as "Tennis elbow" is a clinical syndrome characterized by pain over lateral epicondyle of humerus with radiation to forearm dorsally and to the arm occasionally. This condition is recognized as the the most common overuse syndrome.

Lateral epicondylitis (LE) is common in those aged 40 to 57 years and compromises work productivity.[1-3] Males are affected more commonly

than females.[4] As per estimates,each year around 1-3% of adults are affected by it.[5,6]

The pathology remains unclear, but histopathology reveals that degeneration, disorganization of fibrous tissue, and angiofibroblastic proliferation accompany the diagnosis.[7]

Lateral epicondylitis may be self-limiting in some cases8,9. First-line treatment should be noninterventional. Bracing as well as and topical anti-inflammatory agents, apart from use of eccentric physical therapy regimens are recommended.[8-10]

Although conservative management is successful in most of the cases, there are several cases which don't respond to it and require alternative methods of management like corticosteroid injection, dry needling, extracorporeal shock wave therapy and injection of platelet rich plasma.

Surgical options should be resorted as the last resort to treat relcalcitrant cases of tennis elbow. Dry needling (DN) and corticosteroid (CS) injections have been used to treat lateral epicondylitis.[11-14]

Corticosteroids are known to have both anti-inflammatory and immunosuppressive effect and their mechanism of action involves a complex interaction of these two properties. Dry needling supposedly increases the blood supply with complimentary increase in oxygenation at the pathological site. The resulting neurophysiological effects of needling also enhances opioid secretion and serotonin/noradrenaline release thereby decreasing pain and inflammation.[12,15] In our study,we compared and evaluated the results of Dry Needling and Corticosteroid injections in treatment of lateral epicondylitis in terms of Pain relief and functional improvement.

MATERIALS AND METHODS

This prospective cohort study was carried out among 130 patients in the Orthopaedics Department of Integral Institute of Medical Sciences and Research (IIMSR), Lucknow, Uttar Pradesh, India from September, 2022 to March, 2024.after receiving approval from the institutional ethics committee of Integral Institute of Medical Sciences and Research (approval number: IEC/IIMS&R/2022/27). The patients with symptomatic lateral epicondylitis were diagnosed clinically with Cozen's test . Patients aged 18 years or above with closed physis of either sex not responding to conservative treat ment for 1 month and Persistence of elbow pain for More than 6 months since last steroid injection/ needling were included in the study. Patients with poor skin conditions/skin disorders and any contraindication to the procedure such as bleeding disorders, poor glycemic control, and inflammatory arthritis were excluded. The intensity of pain was assessed with VAS score and disability using Patient-Rated Tennis Elbow Evaluation (PRTEE) questionnaire.

Subsequent to this assessment, the patients were divided using alternate group allocation method, with odd number patients in corticosteroid group and even number in dry needling group.

The patients in corticosteroid group(group A) received 1 ml of local corticosteroid (Methyl prednisolone acetate 40 mg) mixed with 1 ml of 2% xylocaine, injected at the lateral epicondyle. [Figure 1]

Figure 1: Corticosteroid Injected at most tender site

For the dry needling group (group B), percutaneous anesthesia was performed by sterilizing the injection site with povidone iodine and administering block using 2 mL of 1% lidocaine. [Figure 2] Then 3 mL of 1% lidocaine was injected into the periosteum around the lateral epicondyle using a 16-gauge needle. Without pulling the 16-gauge needle out of the skin, the ECRB tendon origin, the bone surface of the lateral epicondyle, and the surrounding area were penetrated by the needle about 15-20 times. [Figure 3] Penetration to the bone surface was confirmed by palpation using the examiner's finger.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

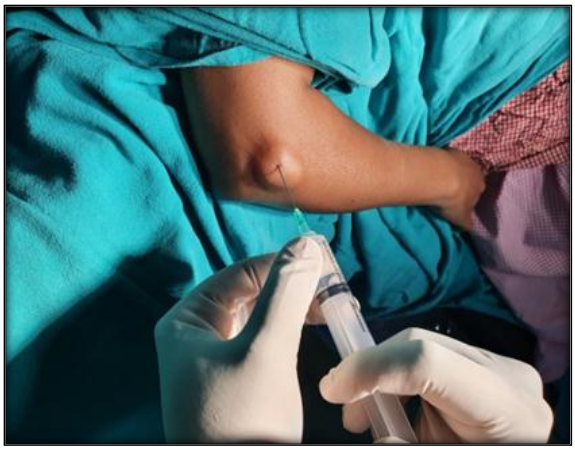

Figure 2: Injecting of lidocaine arond lateral epicondyle

Figure 3: Dry needling using a 16-gauge needle

During the study, the participants did not undergo any other treatments or take analgesics for lateral epicondylitis. The patients were followed up at 3,6 12 and 24 weeks post procedure and PRTEE and VAS scores were recorded.

Data Management and Statistical Analysis

Data so collected was fed into computer using Microsoft Excel 2017 version. Data analysis was performed using IBM Statistical Package for Social Science (SPSS) software version 25. Data has been represented as numbers and percentages for discrete/categorical variables. Continuous data has been represented using mean±standard deviation (SD) as the central tendency. Chi-square test for used to compare qualitative/categorical data. Continuous data was compared between the two groups using Independent samples 't'-test. Mean change in VAS and PRTEE scores was also calculated and compared using Independent samples 't'-test. A p value ≤0.05 was considered statistically significant.

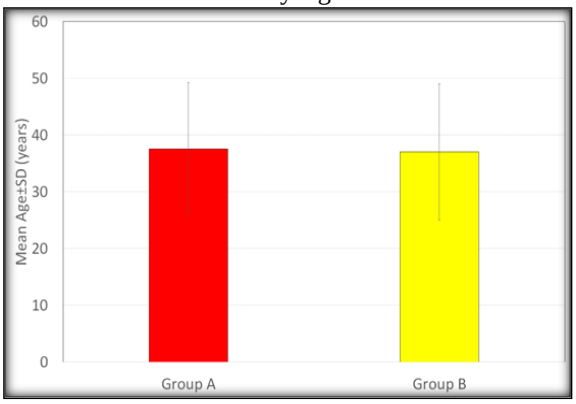

Figure 4: Comparison of mean age of patients in two study groups

Age of patients ranged from 19 to 73 years. Majority of patients in Group A (60.0%) as well as in Group B (58.5%) were aged between 21 and 40 years. There were only 3 (.4.6%) cases each in both the groups who were aged <20 years. In Group A, there were 3 (4.6%) patients and in Group B, there was only 1 (1.5%) patient aged >60 years [Figure 4]. Statistically, there was no significant difference between the two groups for their age profile (p=0.401). Mean age of patients in Group A was 37.50±11.72 years which was slightly higher than 37.05±12.06 years as observed in Group B. However, there was no statistically significant difference in mean age of patients between the two study groups (p=0.791).

RESULTS

Table 1: Comparison of patients in two study groups for profile of current illness

SN	Variable	Group A (n=65)		Group B (n=65)		Statistical significance	
		No.	%	No.	%	χ2	'p'
1.	Side involved						
	Left	33	50.8	30	46.2	0.277	0.599
	Right	32	49.2	35	53.8		
2.	Duration of pain						
	≤6 months	11	16.9	7	10.8	2.138	0.343
	7-12 months	42	64.6	40	61.5		
	13-18 months	12	18.5	18	27.7		
	Mean duration±SD (months)	10.02±3.48		10.22±3.53		t=0.326; p=0.745	
3.	Worsening of pain during activity	40	61.5	46	70.8	1.237	0.266
4.	Previous h/o treatment with injections/needling	14	21.5	21	32.3	1.916	0.166

ISSN (O): 2687-5365; ISSN (P): 2753-6556

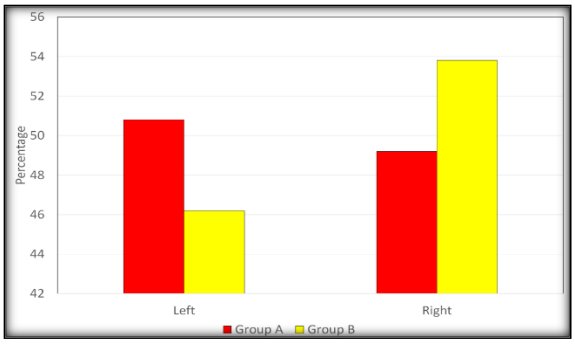

Figure 5: Comparison of patients in two study groups for side involved

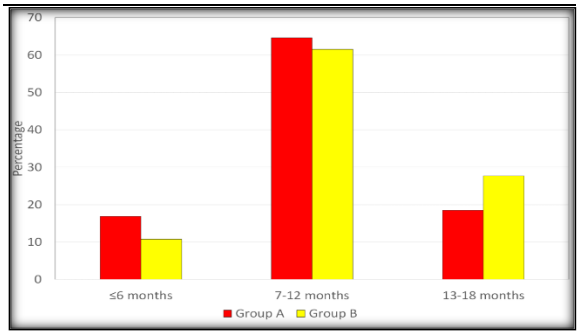

Figure 6: Comparison of patients in two study groups for duration of pain

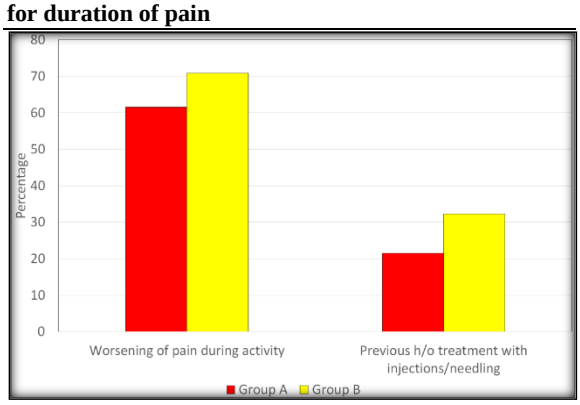

Figure 7: Comparison of patients in two study groups for pain characteristic and history of treatment

In Group A, left side (50.8%) was more commonly involved than the right side (49.2%), however, in Group B, right side was more commonly involved (53.8%) as compared to left side (46.2%), however, this difference was not significant statistically (p=0.599) [Figure 5]. Majority of patients in Group A (64.6%) as well as in Group B (61.5%) had duration of pain between 7 and 12 months. Mean duration of pain was 10.02±3.48 months in Group A as compared to 10.22±3.53 months in Group B. [Figure 6] Statistically, there was no significant difference between the two groups for category of duration of pain (p=0.343) as well as for mean duration (p=0.745) respectively [Table 1]. There were 40 (61.5%) patients in Group A and 46 (70.8%) in Group B who complained of worsening of pain during activity. [Figure 6] Though, this proportion was higher in Group B as compared to that in Group A yet this difference was not significant statistically (p=0.266) [Table 1].

A total of 14 (21.5%) patients in Group A and 21 (32.3%) in Group B had previous history of treatment with injections/needling. [Figure 7] Statistically, the difference between the two groups was not significant (p=0.166) [Table 1].

Table 2: Comparison of patients in two study groups for VAS scores for pain at baseline and different follow-up intervals

SN	Time interval	Group A (n=65)		Group B (n=65)		Statistical significance	
		Mean	SD	Mean	SD	t	'p'
1.	Baseline	6.46	1.24	6.49	1.17	-0.145	0.885
2.	3 weeks	5.38	1.38	5.46	1.38	-0.318	0.751
3.	6 weeks	4.00	1.40	4.62	1.50	-2.418	0.017
4.	12 weeks	2.88	1.48	3.45	1.70	-2.036	0.044
5.	24 weeks	1.69	1.32	2.25	1.24	-2.466	0.015
Overall change in VAS scores at final follow-up as compared to baseline		4.77	1.44	4.25	1.28	2.189	0.030

ISSN (O): 2687-5365; ISSN (P): 2753-6556

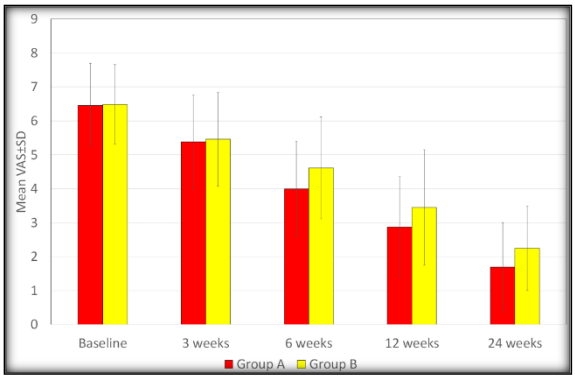

Figure 8: Comparison of patients in two study groups for VAS scores for pain at baseline and different follow-up intervals

In Group A, mean VAS scores for pain were 6.46±1.24, 5.38±1.38, 4.00±1.40, 2.88±1.48 and 1.69±1.32 respectively at baseline, 3 weeks, 6 weeks, 12 weeks and 24 weeks follow-up intervals. Overall mean reduction in VAS scores was 4.77±1.44 in Group A. In Group B, mean VAS scores for pain were 6.49±1.17, 5.46±1.38, 4.62±1.50, 3.45±1.70 and 2.25±1.24 respectively at baseline, 3 weeks, 6 weeks, 12 weeks and 24 weeks follow-up intervals. Overall mean reduction in VAS scores was 4.25±1.28 in Group B. [Figure 8]

On comparing the data statistically, statistically no significant difference was seen between the two groups at baseline and 3 weeks, however, at all the subsequent follow-up intervals mean VAS scores were significantly lower in Group A as compared to that in Group B ($p<0.05$). Overall mean reduction in VAS scores was also found to be significantly higher in Group A as compared to that in Group B (p=0.030) [Table 2]

Table 3: Comparison of patients in two study groups for functional scores (PRTEE) at baseline and different follow-up intervals

SN	Time interval	Group A (n=65)		Group B (n=65)		Statistical significance	
		Mean	SD	Mean	SD	t	'p'
1.	Baseline	65.75	6.00	67.06	7.04	-1.140	0.256
2.	3 weeks	47.68	7.05	48.40	6.91	-0.590	0.556
3.	6 weeks	20.25	3.82	22.86	4.79	-3.442	0.001
4.	12 weeks	16.02	3.40	19.85	3.66	-6.182	0.000
5.	24 weeks	10.38	2.19	12.09	3.18	-3.564	0.001
Overall change in PRTEE scores at final follow-up as compared to baseline		55.37	6.25	54.97	6.93	0.346	0.730

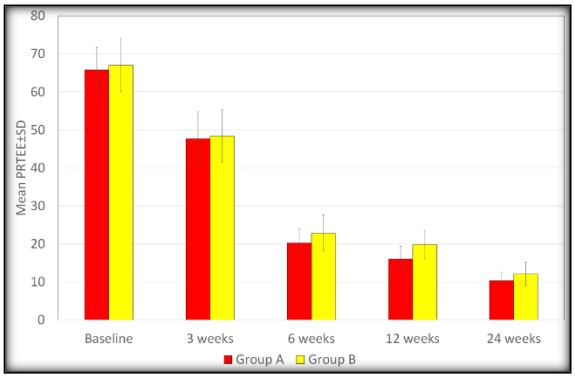

Figure 9: Comparison of patients in two study groups for functional scores (PRTEE) at baseline and different follow-up intervals

In Group A, mean PRTEE scores were 65.75±6.00, 47.68±7.05, 20.25±3.82, 16.02±3.40 and 10.38±2.19 respectively at baseline, 3 weeks, 6 weeks, 12 weeks and 24 weeks follow-up intervals. Overall mean reduction in PRTEE scores was 55.37±6.25 in Group A..In Group B, mean PRTEE scores were 67.06±7.04, 48.40±6.91, 22.86±4.79, 19.85±3.66 and 12.09±3.18 respectively at baseline, 3 weeks, 6 weeks, 12 weeks and 24 weeks follow-up intervals. Overall mean reduction in PRTEE scores was 54.97±6.93 in Group B. [Figure 9]. On comparing the data statistically, statistically no significant difference was seen between the two groups at baseline and 3 weeks, however, at all the subsequent follow-up intervals mean PRTEE scores were significantly lower in Group A as compared to that in Group B ($p<0.05$). Overall mean reduction in PRTEE scores was also found to be higher in Group A as compared to that in Group B but this difference was not significant statistically (p=0.730) [Table 3].

Table 4: Comparison of patients in two study groups for adverse effect profile

SN	Adverse effects	Group A (n=65)		Group B (n=65)	
		No.	%	No.	%
1.	Skin hypopigmentation	0	0	2	3.1
2.	Tendon rupture	0	0	0	0
3.	Postinjection flare	0	0	4	6.2
4.	Local hemorrhage	1	1.5	0	0
Overall complications		1	1.5	5	7.7
$\chi 2=2.796$; p=0.095					

ISSN (O): 2687-5365; ISSN (P): 2753-6556

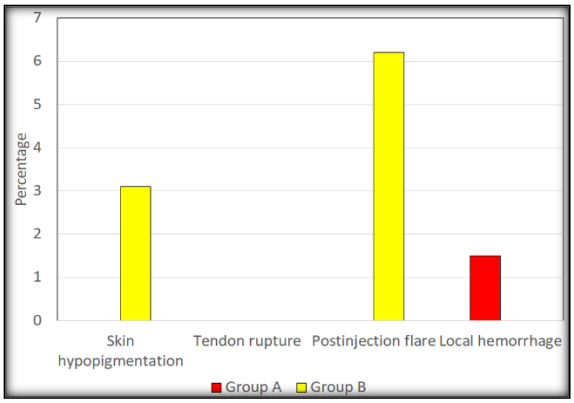

Figure 10: Comparison of patients in two study groups for adverse effect profile

Adverse effects were noted in only one patient in Group A as compared to 5 (7.7%) in Group B. In Group A, the lone patient experiencing an adverse effect experienced local haemorrhage which was later controlled by applying band-aid only whereas in Group B, 3 patients experienced post-injection flare, one experienced post-injection flare followed by hypopigmentation at injection site whereas one patient experienced hypopigmentation at injection site only. The rate of adverse effects was higher in Group B as compared to that in Group A yet this difference was not significant statistically. [Figure 10, Table 4]

DISCUSSION

The present study was planned to compare the clinical efficacy between dry needling and corticosteroid injection treatment for lateral epicondylitis.

Mohanty et al,[16] in their study had a total of 146 patients. Nagarajan et al,[17] on the other hand had only 54 patients in their study. Güngör et.al 18 the other hand had a sample size of 72 allocated to three groups, viz, dry needling, corticosteroid (methylprednisolone acetate) and PRP, comprising of 24 patients each, Compared to all these studies, the sample size of the present study was larger and hence our study has a better statistical value as compared to the earlier studies.

In the present study, at enrolment mean VAS scores for pain were 6.46±1.24 and 6.49±1.17 respectively in dry needling and corticosteroid groups whereas mean PRTEE scores were 65.75±6.00 and 67.06±7.04 respectively in the corresponding groups. Both these scores fell in moderate category. Compared to the present study, Nagarajan et al,[17] assessed the patients for disability using PRTEE only and found mean scores as 70.11 and 64.93 respectively for the two study groups which is close to scores in the present study. Uygur et al,[19] in another study reported baseline PRTEE scores in dry needling and corticosteroids groups as 60.9 and 58.6 respectively which is slightly lower than that in the present study. Besharati et al,[20] on the other hand measured only pain at baseline and reported the mean scores as 8.35 and 8.10 respectively in dry needle and corticosteroid groups respectively, thereby showing them to be in severe range. As such, the assessment of problem has been done using various criteria by different workers and generally the pain and disability at the start of treatment is of moderate order. The clinical profile of the patients for pain and disability was also reflective of moderate pain and disability at the time of enrolment.

In the present study, though VAS scores suggested a superiority of dry needling over corticosteroid injection, yet for PRTEE scores, the performance of the two drugs was almost comparable, with a slight edge of dry needling over corticosteroid injections at the 24 week follow-up interval. However, Nagarajan et al,[17] in their study found reduction in mean PRTEE scores to be significantly higher in dry needling as compared to that in the corticosteroid group. They found a 45.8% reduction in dry needling as compared to 31.9% reduction in PRTEE scores in corticosteroid injection group. Compared to the present study, the reduction in PRTEE scores was much lower in both the groups, which could be attributed to extremely short duration of their study (last follow-up at 8th week). In the present study, however, last follow-up was made at 24th week which is 3 times longer than their study. However, in another study, Uygur et al,[19] found reduction in PRTEE scores at six months to be 67.1% in corticosteroid group as compared to 84.3% in dry needling group and found the difference to be significant. In the present study, however, we observed >80% reduction in PRTEE scores in both the groups. But found the changes in VAS to be significantly higher in dry needling as compared to that in corticosteroid injection group.

While some studies favour dry needling over corticosteroid injections.[17,19] There are some other that do not find a significant difference between corticosteroid injections and dry needling. In one such study, Shah et al,[21] found both drugs to be comparable, though their follow-up was limited upto 4 weeks only. However, Jain et al,[22] in their study that had follow-up duration similar to ours (24 weeks) also did not find a significant difference between the two groups for 24 weeks status for both VAS scores as well as functional scores assessed by DASH.

In the present study, dry needling was safer as compared to corticosteroids with respect to adverse effect profile which is similar to previous studies. In the study by Uygur et al,[19] hypopigmentation and skin atrophy was experienced by 7.6% of patients in corticosteroid group whereas only one patient in dry needle group could not tolerate the pain of intervention. Shah et al,[20] reported skin reaction at injection site in one case in corticosteroid group and local haemorrhage in one case in dry needling group. In the present study we find dry needling to be better than corticosteroid with respect to both clinical outcomes as well as safety.

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Limitations

Non-availability of studies using similar protocol (24 weeks follow-up) was a limitation while comparing the results of the study. We also felt that both VAS scores as well as PRTEE are patient reported scales to measure the treatment outcome. Some more objective tests like hand-grip tests that are more objective and provide a better robust measure of treatment outcome could have helped to get more objective results.

CONCLUSION

The findings of the study showed that both dry needling as well as corticosteroids were useful modalities for treatment of lateral epicondylitis. Of the two modalities, dry needling had an edge over corticosteroids with respect to both reduction in pain and functional outcomes. Dry needling owing to a better safety profile is recommended over corticosteroids for the treatment of lateral epicondylitis. Further studies on a larger sample size and longer duration of follow-up are recommended to assess the systemic effects of the two drugs in addition to their impact on pain and functional outcomes.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556