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Original Article

Effects of Dry Needling in patients having Lateral Epicondylitis

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Abstract

Background: *Lateral epicondylitis (LE) commonly known as tennis elbow, is a degenerative condition affecting the myotendinous junction of the wrist extensors at the lateral epicondyle, predominantly causing pain and reduced function in the affected arm. It is commonly seen in individuals over 45 years old who engage in high-risk activities involving repetitive wrist extension. Conservative management is the mainstay of treatment, but dry needling (DN) is a newer technique with limited evidence in treating LE.* ***Methods:*** *This study involved patients diagnosed with lateral epicondylitis at a tertiary care hospital in Bangladesh. Participants were divided into two groups: one receiving dry needling combined with conservative management, and the other receiving conservative management alone. Pain and functional outcomes were measured using the Patient-Rated Tennis Elbow Evaluation (PRTEE) and the Visual Analog Scale (VAS) at baseline, 1 month, and 3 months post-treatment.* ***Results:*** *A total of 60 patients with lateral epicondylitis were enrolled and randomized into two groups: Group A (n=30) received dry needling in addition to conservative management (oral acetaminophen, exercises, and elbow counterforce brace), while Group B (n=30) received conservative management only. After accounting for losses to follow-up, 28 patients in Group A and 27 in Group B completed the 3-month follow-up. Baseline demographic and clinical characteristics were comparable between the groups ($p>0.05$). At 1 and 3 months, Group A showed significantly greater improvements in PRTEE pain, functional, and total scores compared to Group B ($p<0.001$). VAS scores also demonstrated significantly greater pain reduction in Group A at both follow-ups ($p<0.001$). Group A maintained progressive improvement over time, whereas Group B exhibited initial improvement at 1 month followed by regression toward baseline at 3 months. These findings suggest that dry needling, when combined with standard conservative treatment, offers superior and sustained clinical benefits in managing lateral epicondylitis.* ***Conclusion:*** *Dry needling, when combined with conservative management, appears to be an effective treatment for lateral epicondylitis, offering sustained improvements in pain and function. This technique could be a valuable adjunct to traditional treatments, although further studies with larger sample sizes are needed to confirm these findings.*

Keywords: *Lateral epicondylitis, Tennis elbow, Dry needling, PRTEE, Visual Analog Scale (VAS), Randomized trial*

Introduction: Lateral epicondylitis (LE), first described by Runge in 1873, is a medical condition of the myotendinous junction of the wrist extensors at the lateral epicondyle.[1] Its incidence and prevalence are 1-3% and 10% respectively on general population and among working people aged over 45 years old with high-risk jobs (excessive and repetitive use of wrist extensors like tennis, playing an instrument, typing, manual work). This condition compromises work productivity.[2–4] Previous smoking, obesity, diabetes mellitus on oral hypoglycemic agent, rotator cuff pathology, De Quervain's disease have been identified as significant risk factors.[5,6]

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Histological examination shows that there have been few signs of inflammation, with degenerative appearances predominating characterized by angiofibroblastic degeneration or hyperplasia within the common extensor tendon, particularly affecting the extensor carpi radial is brevis (ECRB). So, LE is considered a degenerative process rather than an inflammatory process.[3,4,7,8] The presenting symptoms for LE are gradual onset of pain in lateral aspect of the elbow, which may radiate distally into the forearm. The precise location of tenderness is usually 1 (one) cm distal to the lateral epicondyle.[1,7,8] Patients also may complain of weakness in grip strength occurring with attempts to grasp or carry objects with the affected upper limb.[9] Pain is often exacerbated or reproduced with different tests. The specific tests include Thomson maneuver (the pain is elicited by resisted wrist extension with the elbow in full extension and the forearm in pronation),[10] Maudley's test (pain reproduced by resistive middle finger extension),[11] Cozen's test (pain reproduced at the lateral epicondyle of a fully extended elbow with resisted wrist extension),1 Mill's test.[1,4,12] Ultrasound is one of the most useful tools to diagnose or rule out LE. Structural changes affecting tendons (thickening, thinning, intra-substance degenerative areas and tendon tears for example), bone irregularities or calcific deposits can be detected. Neo-vascularization can also be assessed by colour Doppler exploration.[4] The non-surgical treatment of Lateral Epicondylitis includes rest, stretching & strengthening exercises, ADL advices, epicondylar counterforce braces, non-steroidal anti-inflammatory drugs, corticosteroid injection, autologous blood injection, platelet-rich plasma injection, extra-corporeal shock wave therapy, use of low-level laser therapy, acupuncture etc.[2] Dry needling (DN) is relatively new method. With aseptic precaution, it is done by inserting six to seven hypodermic needles at the lateral epicondyle region and throughout the course of the extensor carpi radialis brevis tendon down to the bone. These needles are then rotated 3 or 4 times, held in place for 10 minutes, and withdrawn. Immediately after needling, the insertion sites are compressed firmly to avoid excessive bleeding. Although it has been used in the management of myofascial pain, low back pain, trigger points, and rotator cuff tears, there are very few reports of dry needling in lateral epicondylitis.[13] The mechanisms by which DN works are increasing the local blood supplies (and thus oxygenation); neurophysiological effects (both peripheral and central sensitization) thus simulating myelinated & unmyelinated nerve fibers; 'gate-controlling' effects. These all mechanisms may decrease substance-P release, and enhance endogenous opioid, serotonin/noradrenaline release.[14,15] Although, lateral epicondylitis is a self-limiting condition, the rehabilitation may require several months. Moreover, pain may become chronic, and disabling that would carry a heavy healthcare burden for patients and influence their quality of life. As dry needling is useful and not associated with major complications, it is increasingly used to treat a variety of tendinopathies and other pathologies related to chronic pain.12 But, there are few reports of dry needling in lateral epicondylitis.[13] Keeping in mind about its possible beneficial effects and lack of evidence in treatment, we had decided to conduct a study to assess the efficacy of dry needling compared with conservative management among lateral epicondylitis patients in a tertiary care hospital of Bangladesh.

Materials and Methods

This quasi-experimental study was conducted in the Department of Physical Medicine and Rehabilitation at Shaheed Suhrawardy Medical College Hospital, Dhaka, over a period of 12 months from the date of protocol approval. The study population comprised adult patients of either sex, clinically diagnosed with lateral epicondylitis, who had been experiencing pain at the lateral elbow for at least four weeks. Participants were selected using a convenience sampling method from patients attending the department during the study period. The calculated sample size for each group was 20 patients. However, to enhance the precision of the study results, 30 patients were included in each group. Thus, the final sample size was 30 per group, totaling 60 participants in the study. Ethical clearance was obtained from the Ethics Review committee of the hospital, and informed written consent was taken from all participants. Sixty adult patients clinically diagnosed with lateral epicondylitis and presenting with lateral elbow pain for more than four weeks, along with at least one positive provocative test, were selected using convenience sampling and equally divided into two groups.

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Group-A (intervention) received dry needling oral acetaminophen, static stretching, eccentric strengthening of wrist flexors and extensors, and an elbow counterforce brace. Dry needling was performed once under supervision, using 25G, 25-mm needles inserted into the lateral epicondyle and extensor carpi radialis brevis tendon, held for 10 minutes, and removed with compression. No local anesthetic was used. Patients were advised to avoid strenuous activities for four weeks.

Group-B (control) received conservative treatment: oral acetaminophen, stretching, strengthening exercises, and a brace, without dry needling. Data were collected via face-to-face interviews using a pre-tested semi-structured questionnaire. Outcome measures included the Patient-Rated Tennis Elbow Evaluation (PRTEE) and Visual Analog Scale (VAS), recorded at baseline, one month, and three months post-intervention. Additional clinical data were obtained from patient records. Data analysis was performed using SPSS version 25.

4.0 Result:

Table-1.1: Socio-demographic condition of respondents (n=60)

Variables	Group A n=30 n(%)	Group B n=30 n(%)	p value
Age group(year)			0.833*
18-25	3(10)	2(6.7)	
26-45	9(30)	11(36.7)	
46-65	14(46.7)	15(50)	
>65	4(13.3)	2(6.7)	
Mean age	46.8±12.5	44.6±11.87	0.495***
Gender			0.273**
Male	22(73.3)	18(60)	
Female	8(26.7)	12(40)	
Residence			0.432**
Rural	16(53.3)	19(63.3)	
Urban	14(46.7)	11(36.7)	

*Fisher's Exact test, **Chi-square test and ***Student t-test were done

Values were expressed in frequency (n) and percentages were in parenthesis (%) in column and in mean ± standard deviation. Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace. Group B- having only oral acetaminophen, exercises and elbow counterforce brace.

Majority of the respondents were between 46-65 years old in both group A and group B (46.7% and 50% respectively) and the mean age were 46.8±12.5 years and 44.6±11.87 years respectively. Also, male respondents were predominant in both group and majority of the respondents resided from rural area. However, age, gender and residence were statistically similar between groups as $p>0.05$.

Table-1.2 Distribution of occupational status of respondents (n=60)

Variables	Group A n=30 n(%)	Group B n=30 n(%)	p value
Laborer	17(56.7)	12(40)	
Housewife	5(16.7)	8(26.7)	
Sedentary worker	4(13.3)	6(20)	0.387*
Student	0	2(6.7)	
Others	4(13.3)	2(6.7)	

*Fisher's Exact test was done.

Values were expressed in frequency (n) and percentages were in parenthesis (%) in column.
Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace.
Group B- having only oral acetaminophen, exercises and elbow counterforce brace

According to occupational status, most of the respondents were laborer (56.7% and 40%) in both groups respectively.

Table-1.3: Distribution of baseline clinical feature of respondents (n=60)

Variables	Group A n=30 n(%)	Group B n=30 n(%)	p value
Pain in lateral elbow	19(63.3)	12(40)	0.071*
Weakness in grip strength	14(46.7)	10(33.3)	0.292*
Night symptoms	9(30)	10(33.3)	0.781*
Mean duration of symptoms (in weeks)	7.1±3.17	8.13±3.0	0.201**

*Chi-square test and **Student t test were done and multiple response was considered

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Values were expressed in frequency (n) and percentages were in parenthesis (%) in column.
Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace
Group B- having only oral acetaminophen, exercises and elbow counterforce brace

About 63.3% respondents in group A had pain in lateral elbow, also about 46.7% had weakness in grip strength and 30% had night symptoms. Similarly, among group B respondents, 40% had pain in lateral elbow, 33.3% had weakness in grip strength and 33.3% had night symptoms. However, mean duration of symptoms were quite similar in both groups (7.1±3.17 and 8.13±3.0 weeks respectively).

Table-1.4: Frequency of affected side and dominant had of respondents (n=60)

Variables	Frequency (n)	Percentage (%)
Affected side		
Right	27	45
Left	21	35
Bilateral	12	20
Dominant hand		
Right	51	85
Left	9	15

In this study, right hand was affected in about 45% respondents and left hand was affected in 35% respondents. Rest 20% had bilateral lateral epicondylitis. Nevertheless, majority of the respondents had right hand dominant (85%).

Table-1.5: Comparison of two groups in terms of PRTEE scores in baseline, after 1 month and after 3 month

PRTEE score	Group A mean ±SD	Group B mean ±SD	P value
Baseline	**n=30**	**n=30**	
PRTEE pain score	30.23±3.01	31.0±2.13	0.260
PRTEE functional score	64.93±6.03	62.27±5.82	0.087
PRTEE total score	62.7±4.85	62.13±3.28	0.598
After 1 month	**n=29**	**n=28**	
PRTEE pain score	16.24±2.43	24.14±2.46	<0.001
PRTEE functional score	19.37±3.32	53.75±8.37	<0.001
PRTEE total score	25.93±2.75	51.01±4.57	<0.001
After 3 months	**n=28**	**n=27**	
PRTEE pain score	9.35±1.57	30.29±2.03	<0.001
PRTEE functional score	15.46±2.82	62.33±4.96	<0.001
PRTEE total score	17.08±2.58	61.46±2.89	<0.001

*Student t-test was done, Values were expressed in mean and standard deviation
Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace
Group B- having only oral acetaminophen, exercises and elbow counterforce brace

At baseline, PRTEE pain score, functional score and total score had no significant difference, however, after 1 month and after 3 month follow-up, PRTEE pain score, functional score and total score were significantly higher in group A compared to group B.

Table-1.6: Before and after treatment values of PRTEE score

	Group A p value	Group B P value
PRTEE pain score		
Baseline vs. after 1 month	<0.001	<0.001
Baseline vs. after 3 months	<0.001	0.033
After 1 month vs. after 3 months	<0.001	<0.001
PRTEE functional score		
Baseline vs. after 1 month	<0.001	<0.001
Baseline vs. after 3 months	<0.001	0.105
After 1 month vs. after 3 months	<0.001	<0.001
PRTEE total score		
Baseline vs. after 1 month	<0.001	<0.001
Baseline vs. after 3 months	<0.001	0.802
After 1 month vs. after 3 months	<0.001	<0.001

*Paired t test was done,
Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace
Group B- having only oral acetaminophen, exercises and elbow counterforce brace

Among groups A respondents, PRTEE pain score, functional score and total score were significantly decreased after 1 month and kept reducing till after 3 month follow up. In group B respondents, PRTEE pain score, functional score and total significantly reduce after 1 month. However, again increased after

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3 months follow-up and after 3 month scores were quite similar with baseline scores among group B.

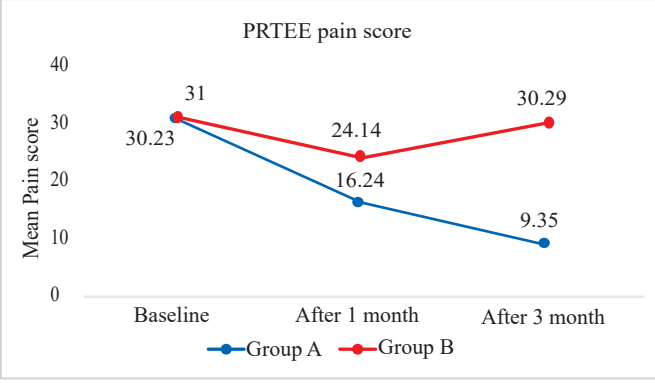

Figure-1.1: PRTEE pain score at baseline, after 1 month and after 3 month in both groups

Figure 2 showed, PRTEE pain score gradually reduced from baseline to after 1 month and till after 3 months follow-up in group A. However, in group B showed pain score reduced after 1 month, but again increased after 3 months follow-up.

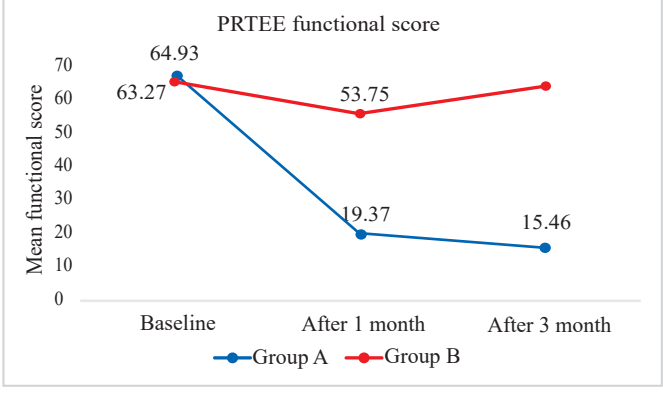

Figure-1.2: PRTEE functional score at baseline, after 1 month and after 3 month in both groups

Figure 3 showed, PRTEE functional score also gradually reduced from baseline to after 1 month and till after 3 months follow-up in group A. However, in group B showed pain score mildly reduced after 1 month, but again increased after 3 months follow-up.

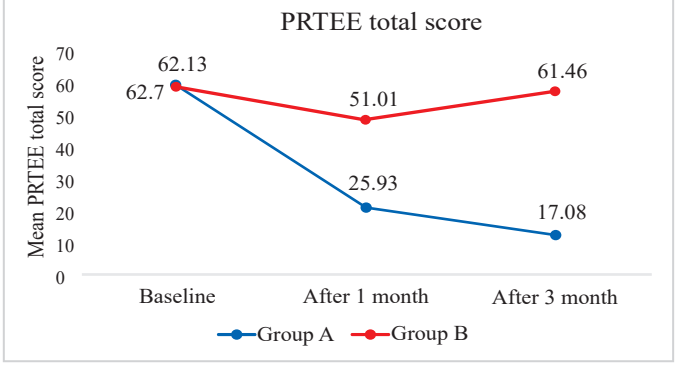

Figure-1.3: PRTEE total score at baseline, after 1 month and after 3 month in both groups

Figure 4 showed, PRTEE total score gradually decreased from baseline to after 1 month and till after 3 months follow-up in group A. However, in group B showed pain score initially decreased after 1 month, but again increased after 3 months follow-up.

Table-1.7: Comparison of two groups in terms of VAS scores in baseline, after 1 month and after 3 month

VAS score	Group A mean ±SD	Group B mean ±SD	P value
Baseline	**n=30**	**n=30**	
	7.73±0.63	7.5±0.62	0.160
After 1 month	**n=29**	**n=28**	
	2.78±0.87	6.11±0.88	<0.001
After 3 month	**n=28**	**n=27**	
	1.64±0.73	7.29±0.61	<0.001

*Student t-test was done, Values were expressed in mean and standard deviation

Group A- who had dry Needling, oral acetaminophen, exercises and elbow counterforce brace

Group B- having only oral acetaminophen, exercises and elbow counterforce brace

Also, VAS score had no significant difference at baseline. Though, after 1 month and after 3 month follow-up, VAS scores were significantly less in group A than group B.

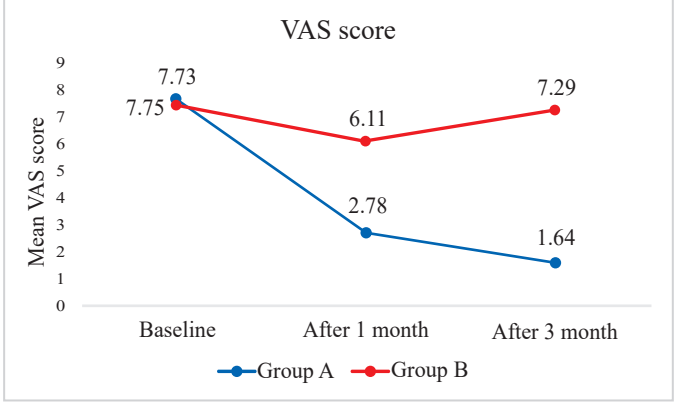

Figure-1.4: VAS score at baseline, after 1 month and after 3 month in both groups

Figure 5 showed, VAS score gradually decreased from baseline to after 1 month and till after 3 months follow-up in group A. However, in group B showed pain score initially decreased after 1 month, but again increased after 3 months follow-up.

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Discussion:

Lateral epicondylitis can be managed through a variety of therapeutic strategies targeting associated trigger points. However, there has been growing interest in a minimally invasive technique known as the dry needling procedure.[16] The procedure involves the use of sterile monofilament needles that penetrate the skin and underlying muscle tissues, targeting trigger point regions to modulate neuromuscular pain and improve movement dysfunction.[17] To evaluate the efficacy of dry needling combined with conservative management in patients with lateral epicondylitis, compared to conservative management alone, PRTEE and VAS scores were recorded before treatment, and at 1-month and 3-month follow-ups.

According to this study, respondents with lateral epicondylitis were mostly between 46-65 years old in both dry needling with conservative managements respondents and in conservative management only (46.7% and 50% respectively) and the mean age were 46.8±12.5 years and 44.6±11.87 years respectively. Also, lateral epicondylitis was more found in male respondents than female in both group, whom were mostly resided from rural area. However, no significant association was found in age, gender, residence of respondents in between groups. In a similar study, it was found that mean age of patients in both groups are approximately equal, though, the number of females was more than males in both groups.[14] This findings were similar to our study, except for male predominance. This may be due to demographic variation to other studies and lack of willingness to participant in this trial.

When a myofascial trigger points is stimulated, 2 important clinical phenomena can be elicited: referred pain and a local twitch response.[18] About 63.3% respondents in dry needling with conservative management group had pain in lateral elbow, also about 46.7% had weakness in grip strength and 30% had night symptoms. Similarly, among only conservative management respondents, 40% had pain in lateral elbow, 33.3% had weakness in grip strength and 33.3% had night symptoms. In this study, right hand was affected in about 45% respondents and left hand was affected in 35% respondents. Rest 20% had bilateral lateral epicondylitis. Observational study of lateral epicondylitis showed, 22% of the study group suffered LE in their dominant arms.[19] Nevertheless, in this study majority of the respondents had lateral epicondylitis in right hand dominant (85%), which may be due to over use trauma. This finding aligns with that of Stenhouse et al., who reported a predominance of dominant hand involvement in lateral epicondylitis.[20]

Dry needling involves the insertion of thin monofilament needles without injective into, alongside, or around nerves, muscles, or connective tissues for the management of pain and dysfunction in neuromusculoskeletal conditions.[16, 20] Pressure pain threshold measurements in the study of Janet Edwards and Nicola Knowles, indicated that superficial dry needle was an effective method of deactivating trigger point.[21] Hence, according to this study, PRTEE pain score, functional score and total score had no significant difference at baseline. However, after 1 month and after 3 month follow-up, PRTEE pain score, functional score and total score were less in respondents with dry needling with conservative management respondents between compared to only conservative management respondents ($p<0.05$). This finding were similar to other study as dry needling was found to be effective at both 3 weeks and 6 months according to PRTEE score but the group II showed no effects at 6 months follow up.[22]

This study also found, PRTEE pain score, functional score and total score significantly reduced from baseline to after 1 month follow up and continued to after 3 months follow-up. However, in only conservative management respondents showed slightly reduced of PRTEE pain score, functional score and total score after 1 month follow-up, again increased after 3 month follow up similar to baseline scores. Similarly in another study, significant differences were detected at the three week follow up in both groups, however, the control group showed no effects at the six month follow up, whereas dry needling was effective at both three weeks and six months. In both groups, a significant difference ($p < 0.05$) in PRTEE (pain and function) scores was detected between before and after treatment at three weeks.[13]

VAS score had no significant difference at baseline in between groups in this study, though, after 1month and after 3-month follow-up, there were significant difference found in VAS score with both groups. Also, VAS score showed significant differences in

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between pretreatment and post treatment findings in both groups, after 1 month follow up, which was coincided to another study.[23] However, respondents with only conservative management showed no effects and pain was worst after 3 months follow up. Above all these findings showed, dry needling with conservative management group was effective at both after 1 month and 3 months follow-up according to PRTEE score and VAS score compared to only conservative management respondents.

Conflict of Interest

The author declares no conflict of interest regarding the publication of this article.

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Author contributions

A. MSA: Conceptualization, study design, supervision, drafting, review, and approval.
B. MA: Data collection, analysis, manuscript writing and revision, review, and approval.
C. SP: Data collection, manuscript writing and revision, and approval
D. MH: Data collection, manuscript writing and revision, and approval

Limitations of the study

1. A small sample size was included in the study
2. The study had a short to midterm follow-up period.

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Conclusion:

This study found that dry needling combined with conservative management significantly improved pain intensity and functional outcomes in patients with lateral epicondylitis, as measured by PRTEE and VAS scores, compared to conservative management alone. Participants receiving dry needling showed a gradual and sustained reduction in both scores at 1-month and 3-month follow-ups. In contrast, those managed with conservative treatment alone experienced an initial improvement at 1 month, but their pain levels returned to near-baseline by the 3-month follow-up.

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