

## Original Article

### The effect of stretching exercise in the management of lateral epicondylitis Khandaker MN<sup>1</sup>, Islam S<sup>2</sup>, Emran A<sup>3</sup>, Islam J<sup>4</sup>, Ahmed SM<sup>5</sup>, Khan MM<sup>6</sup>, Salek AKM<sup>7</sup>

#### Abstract

This comparative study was conducted on patients of lateral epicondylitis attending at Physical Medicine and Rehabilitation Department of BSMMU, Dhaka from June to November 2010 with an aim to assess the effect of stretching exercise in patients of lateral epicondylitis of elbow. Eighty consecutive patients of lateral epicondylitis were randomly assigned to two groups. In group A, patients were treated with stretching exercise, ultrasound therapy (UST), NSAID, advice regarding activities of daily living. In group B, patients were treated with ultrasound therapy (UST), NSAID and advice regarding activities of daily living. The outcome was evaluated at weekly interval for 6 weeks in terms of pain, tenderness and frequency of pain. At 2nd week, the pain in group-A came to satisfactory level, but in group-B, it became so at 4th week. The improvement of tenderness was observed at 2nd and 3rd week in group A and group B respectively, but the improvement in pain frequency achieved at 2nd and 4th week in group-A and group-B respectively. The study concludes that stretching exercise is helpful in the early recovery from lateral epicondylitis, majority of the cases experiencing improvement in pain (both in terms intensity and frequency) and tenderness.

**Key words :** Lateral epicondylitis, stretching exercise, ultrasound therapy

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#### Introduction

Lateral epicondylitis, first described by Runge in 1873, is a medical condition of the myotendinous junction of the wrist extensors at the lateral epicondyle.<sup>1</sup> This condition was described as occurring in tennis players secondary to an improper backswing.<sup>2</sup> Official nomenclature of this entity was declared in 1883 as “Lawn Tennis Elbow” although only approximately 5% of cases are associated with racquet sports.<sup>3,4</sup> However, approximately 50% of tennis player will suffer from this condition at one point in their career, with a high predilection for novice players.<sup>5</sup> This condition typically presents in the dominant elbow, patients who are 45 to 54 years of age without evidence for gender preponderance. The prevalence of lateral epicondylitis is estimated to be 1.3% to 2.8% in the general population<sup>6</sup> and up to 15% in the high-risk occupation that includes butchers, manual laborers, and employees in the fish processing industry.<sup>7</sup> High-risk occupations include ones that involve both a combination of repetitive and forceful movements of the arms. The natural history of this is favorable, with approximately 80% of patients obtaining clinical improvement at one year from onset.<sup>8</sup>

The presenting symptoms for this condition typically involve the insidious onset of pain in lateral aspect of the elbow, which may radiate distally into the forearm. Pain is often exacerbated with resisted wrist extension or repetitive wrist movements, especially with the elbow full extension.<sup>9</sup> Patients also may complain of weakness in grip strength occurring with attempts to grasp or carry objects with the affected upper limb. Edema or erythema at the lateral epicondyle is uncommon, and patients typically have transient symptom relief with activity modification or relative rest of the symptomatic limb.<sup>8</sup>

The diagnosis of lateral epicondylitis is essentially a clinical one. Limited active range of motion with wrist extension, as well as difficulty with maximal passive wrist flexion, may be noted secondary to pain at the lateral elbow. Palpation of the lateral epicondyle is often painful, with maximal point tenderness located at the lateral epicondyle or within 2 to 5 mm anterior and distal to it.<sup>10</sup> Provocation maneuvers also are used by most clinicians in the attempt to induce concordant pain. Cozen’s test, is considered positive if pain occurs at the lateral epicondyle of a fully extended elbow with resisted wrist extension.<sup>10</sup>

Activity modification, NSAIDs, physical therapy, therapeutic exercise are the main modes of treatment. RCTs have found that a watchful-waiting approach was comparable with physical therapy and superior to corticosteroid injection in alleviating a patient's main complaint at one year.<sup>11</sup> Physical therapy by electrotherapeutic modalities, including electromagnetic field therapy and iontophoresis, are effective in treating lateral epicondylitis. Three studies have shown pain reduction and improvement in subjective function with NSAID iontophoresis using diclofenac or pirprofen after two to four weeks.<sup>7,12</sup> Ultrasound therapy is thought to have thermal and mechanical effects on the target tissue leading to increased metabolism, circulation, extensibility of connective tissue and tissue regeneration.<sup>13</sup> The best available data suggest that ultrasonography provides modest pain reduction over one to three months.<sup>7,12,14,15</sup> Local corticosteroid injection has short-term (two to six weeks) benefits in pain reduction, global improvement, and grip strength compared with placebo and other conservative treatments.<sup>11,16,17</sup> However, these benefits do not persist beyond six weeks. Use of an inelastic, nonarticular, proximal forearm strap may decrease pain and increase grip strength after three weeks,<sup>18</sup> but despite the widespread use of orthoses, multiple systematic reviews have been unable to provide conclusions about the benefits of orthoses for lateral epicondylitis.<sup>7,16,19</sup> The literature on this subject suggests that, along with other modalities, therapeutic exercise has an important role. Strengthening and stretching exercises are the main components of exercise programmes.<sup>20-22</sup> Stretching exercises including ballistic, static and proprioceptive neuromuscular facilitation movements have been proposed to increase flexibility.<sup>23,24</sup> Static stretching is defined as passively stretching a given muscle-tendon unit by slowly placing it in a maximal position of stretch and sustaining it there for an extended period of time.<sup>21,25</sup> This maximal stretching position is determined by the moderate discomfort and/or pain that the patient experiences.<sup>24,26,27</sup> Static stretching exercises are individualized by patient feedback as to the discomfort and/or pain experienced during the procedure.

In practice, treatment is usually a combination of therapies which makes the effects of each separate method difficult to assess. In an attempted meta-analysis, Labelle et al showed the contradictory results of different therapies. Therefore, randomised therapy studies in the treatment of lateral tennis elbow syndrome are needed to provide more scientific data.<sup>28</sup>

So an attempt is required to see effect of stretching exercise on patient with lateral epicondylitis of elbow. This study intends to determine the improvement of symptoms in

terms of pain score, tenderness index and visual analogue scale by giving stretching exercise in the management of lateral epicondylitis.

## Methods

This comparative study was carried out in the Department of Physical Medicine and Rehabilitation, Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka over a period of six months from June to November 2010. A total of 80 consecutive patients of lateral epicondylitis, aged 20-80 years, attending at the outpatient department of Physical Medicine and Rehabilitation, BSMMU, Dhaka were selected irrespective of sex. The diagnosis of lateral epicondylitis was confirmed by clinical history i.e. pain lasting for more than one month in the lateral elbow region, tenderness over the lateral elbow region, pain over the lateral elbow region during resisted active extension of the wrist and patients with pain score and tenderness index of 4 or less. Patient with infection, malignancy and systemic illness; lateral epicondylitis with other systemic polyarthrititis, patient with cervical radiculopathy were excluded from the study.

Total 80 patients selected on the basis of above mentioned criteria were randomly assigned to group A or group B using lottery method. Forty patients were allocated to each group. In group A, patients were treated with stretching exercise, ultrasound therapy (UST), NSAID, advice regarding activities of daily living. In group B, patients were treated with ultrasound therapy (UST), NSAID and advice regarding activities of daily living.

Tab-Naproxen 250mg, twice daily after meal was given to all patients for 6 weeks, with Omeprazole 20 mg twice daily for same duration.

UST was given at the following dosimetry : frequency-3 MHz, intensity-0.5 watt/cm<sup>2</sup>, duration 10 minute and two to three days a week for 6 weeks.

For activity modification of daily living, repetitive pronation-supination motions and lifting heavy weights at work were modified or eliminated. Avoidance of grasping in pronation and substituting with controlled supination during lifting were advised. It was advised to lift with the palm up using both upper extremities in a manner that reduces forcible elbow extension, supination and wrist extension whenever possible.

Stretching exercise, wrist extensor stretch and thumb stretch were given to patients of group A for 6 weeks. Each type of exercise was advised for 15 to 30 second repeated for 5 times, twice daily.<sup>29</sup> (Figure 1 & 2)



Figure-1: Wrist extensor stretch.



Figure-2: Thumb Stretch

All the patients were assessed initially weekly for six weeks and the results were recorded in the data sheet. Data were collected from the selected patients using a semi structured questionnaire starting from demographic characteristics, clinical history, a detailed clinical examination. Improvement of was assessed by pain score, tenderness index, pain frequency score, patients assessment of pain (visual analogue scale)<sup>30,31</sup> at the onset of therapy and then weekly for six weeks.

Data were processed and analyzed with the help of SPSS (Statistical Packagr for Social Sciences) for Windows, version 11.5. The categorical data were compared between groups using chi-square test, while the data presented on continuous scale were compared between groups using student's t-test. The repeated measure anova statistics was used to analyze the differences in overall changes in pain score, tenderness index and frequency of pain. Level of significance was set at 0.05 and  $p < 0.05$  was considered significant.

Written consent was obtained from all patients and the study protocol was approved by ethical committee of Bangabanhu Sheikh Mujib Medical University.

**Results**

About one-third (35%) of patients in group-A were in the 20-40 years age group followed by 45% in the 41-60 years and 20% in the 61-80 years old. In group-B, 45% were 20-40 years old, 35% 41-60 years and 20% 61-80 years old. The mean ages of group A and group B were recorded as  $44.5 \pm 1.5$  and  $41.4 \pm 2.5$  years respectively. Most of the patients in either group (75% in group-A and 82.5% in Group-B) were male. One-third of the patients (32.5% in group-A and 27.5% in group-B) were students. Housewives comprised 12.5% in group-A and 7.5% in group-B. No significant difference was observed between the groups with respect to occupation. Seventy percent of the subjects in group-A and 57.5% in group-B belonged to middle class family with no significant intergroup difference ( $p = 0.480$ ).

Gradual onset of pain was the common mode of clinical presentation found in this study (67.5% in group A and 60% in group B). There was no significant difference between the groups in terms of onset of pain ( $p = 0.485$ ). (Table - I)

**Table - I:** Distribution of patients by their pain onset

Pain onset*	Group		p-value
	Group A (n = 40)	Group B (n =40)	
Sudden	13(32.5)	16(40.0)	0.485
Gradual	27(67.5)	24(60.0)	

\* Data were analysed using Chi-square (?). Figures in the parenthesis denote corresponding percentage.

Based on pain score (0-4), the prognosis of pain at 5th week was very satisfactory in group-A than in group-B. The score zero was achieved in 85% of group-A and in 72% group-B. Again, in case of group A, a significant improvement of pain was evident at week 2 when pain score was  $1 \pm 1.03$ , which in group B required 2 more weeks to reach ( $p = 0.05$ ) (Figure – 1 & Table - II)

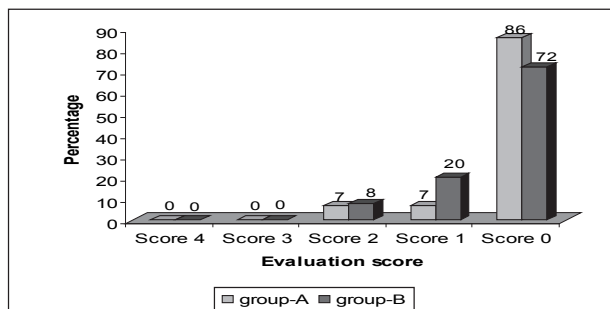


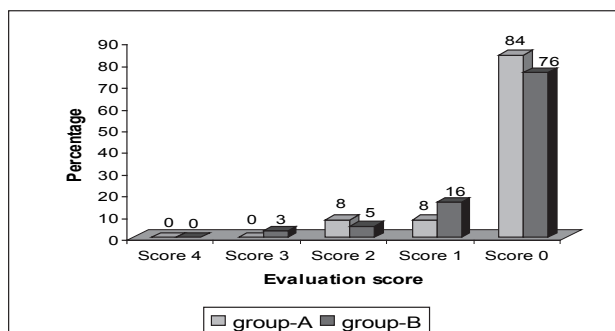
Figure-1: Evaluation of pain at 5th week

**Table-II:** Comparison of pain intensity at follow up between groups

Group*	Pretreatment Pain score (0-4)	Follow up pain score (0-4)					p-value
		W 1	W 2	W 3	W 4	W 5	
Group A (n = 40)	3 ± 0.9	2 ± 1.05	1 ± 1.03	1 ± 0.5	0 ± 0.8	0 ± 0.6	0.05
Group B (n = 40)	3 ± 0.85	3 ± 0.68	2 ± 1.27	2 ± 0.9	1 ± 0.7	0 ± 0.9	

\* Data were analysed using Repeated measure ANOVA and were presented as mean ± SD  
 'P' refers to overall difference between groups from pretreatment to endpoint of study.

The improvement in tenderness between groups at 5th week, when most (approximately 85%) of the patients of group-A achieved a tenderness score of zero which in group B was achieved in 76% of cases. (Figure – 2)



**Figure-2:** Evaluation of tenderness at 5th week of follow up

**Table-III:** Comparison of pain frequency at follow up between groups

Group*	Pretreatment pain frequency score (1-5)	Follow up pain frequency score (1-5)					p-value
		W 1	W 2	W 3	W 4	W 5	
Group A (n = 40)	3 ± 0.80	2 ± 1.12	1 ± 1.29	1 ± 0.92	1 ± 0.6	1 ± 0.02	0.05
Group B (n = 40)	3 ± 0.80	3 ± 1.01	2 ± 1.16	2 ± 0.58	1 ± 0.8	1 ± 0.06	

The data about overall improvement of pain, tenderness, frequency of pain on the basis of corresponding scoring system demonstrates that at 2nd week, the pain in group-A came to satisfactory level, but in group B, it became so at 4th week.

The improvement of tenderness was observed at 2nd and 3rd week in group A and group B respectively, but the improvement in pain frequency achieved at 2nd and 4th week in group-A and group-B respectively. (Table IV)

**Table-IV:** Comparison of outcome between groups

Study groups	Pain score improved	Tenderness Index improved	Pain frequency score reached satisfactory level
Group A	Week 2	Week 2	Week 2
Group B	Week 4	Week 3	Week 4

## Discussion

This study was aimed at determining the prognostic outcomes among the study population (on the basis of pain score, tenderness index and frequency of pain). The main outcome studied in this comparative study was impact of stretching exercise on patients of lateral epicondylitis evaluated in terms of pain score, tenderness index and pain frequency before and after intervention.

Following intervention, the improvement of pain was very satisfactory in group A than in group B. A zero score was achieved in approximately more than 85% of experimental population, compared to about 72% in control group, when one patient in each group was associated with score 4 or 3. In group A, a significant improvement of pain was evident at week 2 when pain score was  $1 \pm 0.3$ , but in group B it required 2 more weeks to reach the score  $1 \pm 0.7$ . The improvement of pain in both groups was further evident at the end of 5th week compared to their pretreatment stage.

The gradual changes in pain score between groups showed that at 5th week, most (approximately 85%) of the patients of group-A had a zero score on the basis of tenderness index which in group B was a little bit lower (76%) of cases. The improvement in tenderness index was further noted in both groups at the end of 5th week in relation to pretreatment status.

Frequency of pain during the course of treatment was assessed using the pain frequency score (1-5). At of 4th week of intervention, both the groups achieved a clinically satisfactory level of score ( $1 \pm 0.6$  in group A and  $1 \pm 0.8$  in group B).

The findings obtained in terms of overall improvement of pain, tenderness and frequency of pain demonstrate that at 2nd week, the pain in stretching exercise group reduced to satisfactory level, which in group B was observed near the 4th week. The improvement of tenderness was observed at 2nd and 3rd week in group A and group B respectively, while the improvement in pain frequency evident at 2nd and 4th week in group-A and group-B respectively. Consistent with the findings of the present study, Peterson and colleagues, 2011 in their randomized controlled trial of exercise versus wait-list in chronic tennis elbow demonstrated that exercise group had a better and faster regression of pain both during muscle contraction and muscle elongation.<sup>32</sup> Several other studies also reported that exercise programmes appear to reduce the pain and improve function, reversing the pathology of later epicondylitis.<sup>22,33,34</sup> Several other investigators however, reported that stretching and strengthening

exercises (one or more times daily, three days a week for six weeks or more) can reduce pain, but the improvement in grip strength is less clear.<sup>7,12,14</sup> However, regimens should focus on eccentric instead of concentric phases. The way that an exercise programme achieves the goal remains uncertain, as there is lack of good quality evidence to confirm that physiological effects translate into clinically meaningful outcome and vice versa.

Although a home exercise programme can be performed any time during the day without supervision from a physiotherapist, our clinical experience has shown that patients fail to comply with the regimen of home exercise programmes and many patients stop the home exercise programme without giving explanations.

Stretching exercise like wrist extensor stretch and thumb stretch performed 5 times twice daily each lasting for 30 seconds, along with other adjuvant therapy, helps in overall improvement of pain, tenderness and frequency of pain in patients with lateral epicondylitis. The pain reduces to satisfactory level by the 5th week in majority of the cases. Therefore the study concluded that stretching exercise helps early recovery from the condition with most of the cases experiencing improvement of pain (both in terms intensity and frequency) and tenderness.

However, further study with larger sample is needed in different institutes of different health care delivery system in Bangladesh to get more valid picture about the impact of stretching exercise on lateral epicondylitis.

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