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KM Amran Hossain
Lecturer of Physiotherapy, Bangladesh Health Professions Institute, Dhaka-1343, Bangladesh

Mohammad Shahadat Hossain
Doctoral Fellow, Jahangirnagar University, Savar, Dhaka-1342, Bangladesh

Sapia Akter
Consultant Physiotherapist, ASPC Manipulation Therapy Centre, Dhaka-1207, Bangladesh

Dr. Nasirul Islam
Visiting Faculty, Bangladesh Health Professions Institute, Apt 1412, 10-Teesdale Place, Scarborough, Toronto, ON, Canada

Md. Shahoriar Ahmed
Project Coordinator, BPA-Towards Global Health (HI), Dhaka-1207., Bangladesh

Zahid Hossain
Lecturer of Physiotherapy, Bangladesh Health Professions Institute, Dhaka-1343, Bangladesh

Correspondence Author:
KM Amran Hossain
Lecturer of Physiotherapy, Bangladesh Health Professions Institute, Dhaka-1343, Bangladesh

Effectiveness of myofascial release to biceps brachii, latissimus dorsi & pectoralis major in structural diagnosis and management protocol for patients with tennis elbow

KM Amran Hossain, Mohammad Shahadat Hossain, Sapia Akter, Dr. Nasirul Islam, Md. Shahoriar Ahmed and Zahid Hossain

Abstract
Background: Tennis Elbow (TE) is a common disorder affecting the tendinous origin of the wrist extensors and evidences suggest association of trigger points in Biceps brachii, Pectoralis major and Latissmus dorsi with TE. Structural diagnosis and management (SDM) is a comprehensive biomechanical assessment process to treat musculoskeletal dysfunctions conceptualized by Dr, M Shahadat Hossain over 15 years of clinical practice.
Objective: The objective of the study was to find out the effectiveness of myofascial release technique of Biceps brachii, Pectoralis major and Latissmus dorsi in SDM approach on pain and associated impairments in TE subjects.
Study design: This study was a pilot randomized controlled trial (RCT). The study was conducted in the Outdoor musculoskeletal physiotherapy department of Centre for the Rehabilitation of the Paralyzed (CRP) and Popular Medical College Hospital. 20 subjects with the LE were introduced in two groups equally. The MFR in SDM treatment protocol was provided for four weeks with 10 sessions. As Outcome measures Pain was measured by numerical pain rated scale (NPRS), ROM measured by using universal Goniometer, muscle powered measured by OXFORD grade scale and functional disability measured by patient rated tennis elbow disability questionnaires (PTEDQ). The outcome was assessed at baseline and after 4 weeks by independent assessor.
Result: The result shown a significant decrease in pain and improvement in functional performance (p<0.05) in SDM group compared to control groups. MFR in SDM protocol found to have a greater effect on all outcome measures in TE subjects. However no significant change has been noted in ROM in any group.
Conclusion: The result of this pilot study indicates that 4 weeks with 10 session of MFR in SDM Protocol was effective in improving pain and associated impairments in tennis elbow patients.

Keywords: Tennis elbow, MFR, structural diagnosis & management

Introduction
Lateral Epicondylitis (LE) or Tennis elbow (TE) as it is well known musculoskeletal condition of elbow, first introduced 100 years ago by Runge in 1873 [2, 14]. TE is one of the most common condition generally affect to the extensor carpi radialis brevis (ECRB), and the extensor digitorum communis muscles to the lateral epicondyle and most often affected in the dominant arm rather than non-dominant arm [3, 10]. This is a debilitating disorder occurring most often between the third to sixth decades of life [4] with a prevalence of 1 to 3% of general population and high risk of hand task industries 15% [3-8, 17]. Evidence found the etiology of TE as local trauma, repeated overuse of hypovascular zone [9], contusion, or sprain, soft-tissue calcification, bursitis, monotonous, repetitive eccentric contractions and gripping activities of the wrist [7] radiohumeral synovitis [2], tear of the extensor carpi radialis brevis muscle [4], avulsion of the tendon origin [8], displacement of the orbicular ligament on the radial head [7] or idiopathic spontaneous occurrences [2]. The impairments of the condition have a major impact on social participation and professional life [9].
Every year, near about four among one thousand adults come to medical practitioner with elbow pain where initial diagnosis of TE can be interpreted therefore less of them has

perfect diagnosis [14, 9]. TE patients visits Physiotherapists and a wide range of physiotherapy regimen as electrical stimulation, laser, ultrasound, manual therapy techniques, acupuncture, NSAID's along with corticosteroid injections have been introduced; Manual Therapy techniques include stretching, strengthening, transverse friction, manipulation, strain and counter strain technique [13].

TE manifests several sign and symptoms related to specific muscles of wrist extensor; but there are more associations relating arm, shoulder, neck and back [20]. Gun & Milbrant [21] conducted a baseline study on the cases that were not responded to conventional management of TE on the affected site. The study found that there is strong association of motor points of pectoralis major, shoulder rotator cuff, neck and trunk muscles on the basis of frequency of tenderness. In the study, the tender points located in Biceps brachii and latissmus dorsi and causing remarkable postural abnormality of upper quarter in affected side of TE patients. The idea to release these muscles was from the biomechanical analysis derieved from Structural diagnosis and Management (SDM) concept. SDM concept of musculoskeletal medicine focuses on a comprehensive approach to assess both the contractile and non-contractile structures to generate a hypothesis to solve the specific sources hindering normal activities. This has been developed from 15 years' experience of Dr. M Shahadat Hossain treating diverse cases of musculoskeletal medicine. The SDM assessment directs conservative management procedure in a way of taking history, examination of arthokinemetic and osteokinemtic motions, stretching the series of muscles with biomechanical rationale, strength the relative stabilizer, examination to the biomechanical contributor, myotomes and isolated release to neural sensitive structures to treat patients (Figure 1).

Gerwin stated [22] Myofascial release (MFR) of trigger points may improve impairments and functional state of upper extremities in different musculoskeletal conditions. MFR is being used as good efficacy for the patients with TE and usually have two types; Stanborough explains one as direct technique MFR and second as indirect technique [11]. Evidence suggests that, MFR is used in restricted fascial layers either directly or indirectly as slow with sustain pressure ranging 120 seconds to 300seconds. During direct technique MFR, pressure is being applied by the practitioners hand in knuckles shape of hand, elbow or other tools to apply tension or stretch slowly into the fascia [12].

The pilot study has been conducted to enlist the associated trigger points in TE patients at physiotherapy department of 2 rehabilitation centre at Dhaka, Bangladesh. The trigger points were diagnosed according to the recommended guideline of Johnson and Dommerholt [19]. The study states Trigger point can be diagnosed by palpable taut band in accessible muscle, extreme spot tenderness of a nodule in a taut band or by an indicative point of pain located by patient. The pilot study recognized biceps brachii, latissimus dorsi & pectoralis major as the tender points and active nodules in most cases. Hence, the study has been conducted to find out the effectiveness of Myofascial Release Technique (MFR) in SDM concept to the biceps brachii, latissimus dorsi & pectoralis major to elicit changes in pain, ROM, Muscle power and functional disability in tennis elbow patients.

Materials and Methodology

Total 25 participants screened with tennis elbow from musculoskeletal department of CRP and Popular Medical College Hospital (PMCH) has been screened for eligibility. Then 20 subjects with the TE were introduced in this study according to inclusion criteria. Inclusion criteria were diagnosed case of TE by graduate physiotherapist or physician with an age 14-60 years of both sexes. The diagnosis has been done through several special tests as cozen test, Mills test, middle finger extension test [23] resisted wrist extension test [24], resisted radial deviation test, palpation test [25]. Exclusion criteria were infective conditions of upper limb, dermatitis, malignancy or hazardous to myofascial release.

Interventions

The subjects were divided into two different groups randomly by concealed allocation; one group received MFR in SDM concept (n=10) and another group received Conventional physiotherapy (n=10). The predefined treatment protocol was provided for four weeks with 10 sessions. The pain, ROM, Muscle power, and functional disability were assessed at baseline assessment and after last treatment session.

Myofascial Release Technique in SDM

Myofascial release has been applied to fascia's excessive pressure on the pain sensitive structure and restores proper alignment [26] prior to diagnosis through SDM. The procedure is low load long duration stretched over the fascia complex which intended to restore optimal length and decrease pain and improves function [15-17].

The steps of the technique were as follows (Figure 1)

1. Place the patient in supine lying position; place the affected shoulder free from any restriction (Picture A)
2. To release Biceps place the shoulder in 30 to 40 degree abduction with less than half range of external rotation (Picture B) Press over humeral head outward and inward (Picture C) and perform arm distraction. Concern about the pain and progress according to the tolerance of patient.
3. To release pectoralis major and latissmus dorsi place the shoulder 90 degree abducted, more than half of external rotation and elbow in 90 degree (Picture D). Press over humeral head, upper shaft of humerus and muscle belly of pectoralis major from this position onwards up to full external rotation (Picture E, F).

The interventions have been applied for 10 sessions in 4 weeks. A session of MFR consisted 3- 5 minutes in a trigger point with total release time exceeding not more than 7-10 minutes.

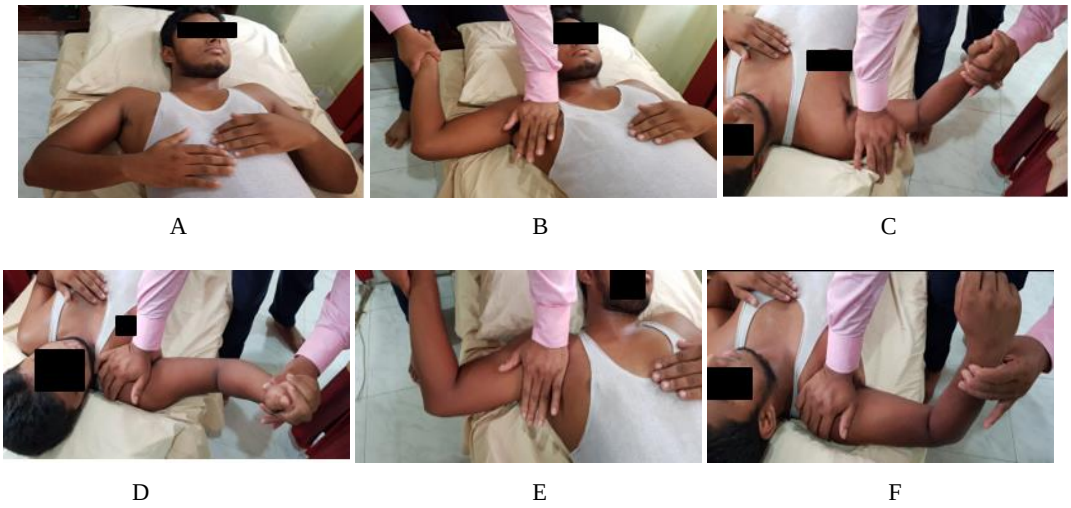

Fig 1: MFR in SDM protocol for Biceps, Pectoralis & Latissmus dorsi in TE Patients

Conventional Physiotherapy: Conventional physiotherapy included the variety of physiotherapy regimen that is generally applied as the treatment of TE [16, 17]. Treatment includes electrical modalities as cryotherapy, LESER, Transcutaneous electrical nerve stimulation (TENS), Infrared Radiation (IRR), and ultrasound. In addition stretching exercise, strengthening exercise has been prescribed. Elbow has been supported by elbow band, or splint. To maintain the efficacy self- stretching, awareness and education has been provided to patients. As electrotherapy, Pulse ultrasound provided only those patients who are recommended [15, 16]; Frequency was 1 MHz, Intensity was 0.8 W/cm2, provided in pulse mode with 1:4 ratios, for 5 minutes for 4 weeks. The stretching exercise has been performed both in laying and sitting position where shoulder flexed in 90 degrees and elbow extended where therapist hand pulling wrist into flexion [15-17]. The Strengthening exercise has been performed both sitting and lying position where therapist give the manual resistance over dorsum aspects of the hand and patients instructed to perform full extension of the wrist [15-17].

Ethical Issue

Research proposal was submitted for approval to the administrative bodies of Institutional review board of Bangladesh Health Professions Institute. The intervention provider and data collector followed the Helsinki guideline and CRP ethical committee guidelines. Researcher strictly maintained the confidentiality and Informed consent was taken individually from the participants. Every participant had to right to proceed or withdrawal from the study anytime. Data has been collected by separate data collector, auditor and blinded assessor.

Outcome Measures

Numeric pain rating scale (NPRS) a valid 0 (no pain) to 10 (worst pain) point scale to measure the pain status of LE subjects [18] Patient rated tennis elbow disability questionnaire (PRTEDQ) were used to measure the functional disability of TE subjects [27] OXFORD grade scale used to measure the muscle power of TE subjects. The outcome measure during baseline assessment and effectiveness compare after 4 weeks (10 sessions) treatment.

Statistical Analysis:

The analysis is being done by a statistician using SPSS 20 version and Microsoft excel 2007. The significance level was set at 95% CI where (p=0.05). Descriptive analysis is being used for measure the mean and SD. For inter group comparison using "t" test and Mann Whitney "U" test and for intra group comparison paired t and Wilcoxon sign rank test is being used.

Result

Table 1: Demographic variable of SDM (n:10) and control group (n:10)

	SDM	Control	P value
	Mean (SD)	Mean (SD)	
Age	42 (±18.87)	37.6 (±10.34)	0.001*
Occupation	5 (25%) Service holder, 4 (20%) Housewife, 1 (5%) Student	5 (25%) Service holder, 5 (25%) Housewife	
Gender	5 male (25%), 5 Female (25%)	4 male (20%), 6 Female (30%)	
Side elbow pain	4 (20%) Front, 1 (5%) Medial, 4 (20%) Lateral, 1 (5%) Back	9 Front (45%), Lateral (5%)	
Forceful Activity	10 (50%) Yes	8 (40%) Yes, 2 (10%) No	
Pain state	3 (15%) Improving, 5 (25%) Worsening, 2 (10%) Staying same.	7 (35%) Worsening, 3 (15%) Staying same.	
Current problem	6 (30%) Every time, 4 (20%) Sometime	8 (40%) Every time, 2(10%) Sometime	

* Significant (<.05)

Both SDM and control groups age between 3rd and 4th decade of life, most of the subject of experimental and control were respectively service holder and housewife (Table 1). In SDM group both gender were equal and in control group shows prominence of female 6 (30%). SDM

has less pain worsening (25%) subjects than control group (35%).

The statistical analysis of individual groups shows a significant decrease in pain and improvement in functional performance (p<0.05) in SDM group compared to control group (table 2). The between group comparison shows relative improvements in both groups in pain and associated impairments, but SDM has marked change than control (table 3).

Table 2: Pre and Post treatment within group comparison (n: 20)

Pre-treatment Group Comparison							
Scale		**SDM Group**			**Control Group**		
		Min	Max	Mean (SD)	Min	Max	Mean (SD)
NPRS		5	9	6 (1.58)	7	10	4.7 (.66)
PRTEQ		0	5	5.73 (2.03)	4	9	6.88 (1.512)
OXFORD Grade	Flexion	3	4	3.90 (.31)	3	5	3.80 (.63)
	Extension	3	5	4 (.47)	3	4	3.60 (.51)
Post-treatment Group Comparison							
Scale		**SDM Group**			**Control Group**		
		Min	**Max**	**Mean (SD)**	**Min**	**Max**	**Mean (SD)**
NPRS		0	4	1.16 (.937)	0	4	1.81 (.544)
PRTEQ		0	3	.76 (.74)	0	5	2.86 (1.067)
OXFORD	Flexion	5	5	5 (0)	4	5	4.90 (.31)
	Extension	5	5	5 (0)	4	5	4.60 (.51)

Table 3: Intra group comparison between control group and SDM group

Scale			**SDM group**				**Control Group**			
			Min	**Max**	**Mean (SD)**	**P Value**	**Min**	**Max**	**Mean (SD)**	**P Value**
NPRS		Pre	5	9	6 (1.58)	.001*	7	10	4.7 (.66)	.005*
		Post	0	4	1.16 (.937)		0	4	1.81 (.544)	
PRTEQ		Pre	0	5	5.73(2.03)	.04*	4	9	6.88 (1.512)	.06
		Post	0	3	.76 (.74)		0	5	2.86 (1.067)	
Oxford Grade	Pre-test	Flexion	3	4	3.90 (.31)	.02*	3	5	3.80 (.63)	.05
		Extension	3	5	4 (.47)	.04*	3	4	3.60 (.51)	.02*
	Post-test	Flexion	5	5	5 (0)	.02*	4	5	4.90 (.31)	.05
		Extension	5	5	5 (0)	.04*	5	5	4.60 (.51)	.02*

* Significant (<.05)

Discussion

The purpose of this study was to evaluate the effectiveness of myofascial release in SDM concept at Biceps brachii, latissmus dorsi and pecoralis major compare to only conventional physiotherapy for tennis elbow. This is the unique component of the study; there are available resources on managing the affected site but making considerations to arm, chest and back components in TE is something beyond imagination and this study is creating new concepts to consider. Ajimsha and colleagues [30] conducted a single blind RCT to investigate the effect of myofascial release vs. sham ultrasound on pain and function in 65 computer professionals suffering from chronic lateral epicondylitis or TE. Both groups were similar in baseline characteristics such as gender, age, body mass index, seniority and duration of symptoms. The treatment intervention was three days per weeks for four weeks. They use patient rated tennis elbow evaluation for measurement of pain. They concluded that MFR technique is more effective than control group. In this study, control group had little more pain in baseline from SDM group but both group had improvement in pain, muscle strength and patient rated disability with a significant level <.05 but SDM group had more significant improvements than control. An experimental study [28] on 30 participants with chronic lateral epicondylitis, myofascial release technique has been applied and in outcome measures found that the myofascial release technique significantly improved pain, grip strength and functional activity.

In the study, 10 sessions on MFR has been applied and similar [29] study on 36 patients with TE investigated the comparison of active releasing technique and myofascial release technique on pain, grip strength and functional performance. They concluded that 12 sessions of treatment both active release technique and myofascial release technique were effective in the treatment of chronic lateral epicondylitis but myofascial release technique was found superior than active release technique.

We found very little research evidence in the regards of TE treatment protocol in biceps brachii, pectoralis major and latissmus dorsi muscles; this was a primary limitation. None of the studies suggest any specific evidence based treatment protocol. This study of 4 weeks MFR technique in SDM concept found to be effective for TE subjects and found significant change to decrease pain in NPRS and functional improvement in PRTEQ and improve in muscle power and disability. Other limitations were smaller sample size, blinding process and duration of the study.

Conclusion

This investigation of MFR technique in SDM concept explores the new era for the evidence based treatment of TE subjects. Study explored MFR in SDM concept to Biceps brachii, Pectoralis Major and Latissmus dorsi can improve pain, muscle strength and disability state induced by TE. Further studies with larger samples in multi-centre setting along with follow up can evident more to enhance a new dimension in evidence based practice of TE for physiotherapy professionals.

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Conflict of interest: Author declares no conflict of interest.

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