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The clinical efficacy of thoracolumbar fascia release for shoulder pain

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Objective: This study aimed to elucidate the effects of thoracolumbar fascia release (TLFR) on the degree of pain and disability in patients with shoulder pain.
Design: Randomized control trial.
Methods: Thirty subjects with shoulder pain participated in this study. They were allocated to TLFR group (n=15) and manual physical therapy (MPT) group (n=15). Shoulder pain and disability index (SPADI) and the score on the visual analogue scale (VAS) were measured before and after TLFR.
Results: In the TLFR group, the degree of shoulder pain as indicated by SPADI measured after the intervention significantly differed from that before the intervention (p<0.05); moreover, in the MPT group, the degree of shoulder pain was significantly lower (p<0.05). The data of the 2 groups before the intervention significantly differed from those after the intervention (p<0.05). SPADI significantly differed within the groups (p<0.05), but not between the groups. The sum of SPADI did not differ significantly between the groups. The VAS scores of shoulder pain measured before the intervention significantly differed from those measured after the intervention (p<0.05) in the both groups. After the intervention, shoulder pain decreased significantly in the TLFR group as compared to that in the MPT group.
Conclusions: TLF release was effective in reducing shoulder pain. The results of this study can be applied in clinical practice for TLFR performed to reduce shoulder pain. Further studies will need to be performed to elucidate the effects of TLFR on functional recovery.

Key Words: Myofascial, Shoulder pain, Thoracolumbar fascia

Introduction

Patients with shoulder pain show a high incidence of musculoskeletal disorders that account for approximately one-third of the reasons for visiting a doctor [1,2]. Shoulder pain occurs in 7%-36% of the population [3].

Various approaches such as electrical stimulation therapy, acupuncture, manual physical therapy (MPT), and therapeutic exercises, have been proposed to resolve musculoskeletal disorders [4]. Among therapeutic massages and joint mobilization techniques, MPT that includes manipulation increases the range of motion and improves joint functionality as well as reduces shoulder pain [5].

One of the main fascia, the connective tissue of the musculoskeletal system, protects the visceral organs of the body and, at the same time, forms a three-dimensional network throughout the body. The fascia has been thought to play a passive role in inactive structures, such as the cushioning system [6,7], and considered to be less important than the fascia in other tissues [8]. However, a decrease in the function of the fascia is likely to cause a potential stress to the structures surrounded by the fascia, and in turn affect the functioning of the whole body [9]. Disruption in the three-dimensional alignment of the fascia reduces biomechanical

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functions [10].

Myofascial release (MFR), performed as part of osteopathy techniques for resolving problems in the fascia by reducing the adhesion of the fascia, is widely used for the restoration or optimization of the fascia movement in an acute or chronic condition [11-15]. As reported previously, MFR and decrease in pain represent the effects on the quality of life of patients [16,17].

Myofascia receives sensory innervations, and sensory peptides may be a potential cause of chronic pain [18-20]. In addition, the fascia is closely related to the autonomic nervous system [21]. Believed to arise from the autonomic nervous system, myelinated and demyelinated fibers were found in the fascia [22].

A major connective tissue structure, the thoracolumbar fascia (TLF), covers the deep muscles in the back of the spine and abdominal muscles. TLF acts as a force-transmitting structure; the latissimus dorsi, gluteus maximus, and other muscles in the region are connected with a number of muscles involved in the movement of the proximal limbs. Moreover, previous experimental studies showed noticeable effects of TLF on pain. Hypertonic saline administered to the targeted muscles and subcutaneous tissue in healthy adults caused pain and discomfort is greater than the amount injected was found not to be spread to the waist [23]. Recent electrophysiological studies showed that the lumbar dorsal horn receives pain signals from the TLF, indicating that the TLF could be the cause of back pain [19].

We think that the TLF release (TLFR) approach should be considered when the upper extremities are affected. However, studies using TLFR for the upper extremities have been limited. This study aimed to apply TLFR for patients with shoulder pain, and to evaluate the effect of TLFR on pain and function in the shoulder joint.

Table 1. General characteristics of the subjects (N=30)

Characteristic	TLFR group (n=15)	MPT group (n=15)	*p*
Age (y)	46.93 (8.55)	48.40 (10.33)	0.675
Sex (male/female)	5/10	3/12	0.426
Weight (kg)	64.00 (8.58)	59.20 (6.38)	0.093
Height (cm)	162.93 (8.98)	165.40 (6.31)	0.391

Values presented as mean (SD) or number only.
TLFR: thoracolumbar fascia release, MPT: manual physical therapy.

Methods

Subjects

Our study was approved from Sahmyook University institutional review board. For this study included men and women (30 people) who agreed to participate in the experiment; a detailed explanation about the purpose and methods of the study was given to the participants. The participants were outpatients with shoulder pain who visited SOL Rehabilitation Hospital located in Gangseo-gu, Seoul, Korea. Of the 30 patients selected, 12 were excluded. The inclusion criteria of this study were as follows: (1) fracture or dislocation of the shoulder without subluxation; (2) no history of a surgery for the shoulder joint; and (3) no symptoms of cervical spine problems. The general characteristics of the study participants are presented in Table 1.

Procedures

In the present study, we applied TLFR, mainly performed as part of osteopathy techniques, which, for the fascia, can be divided as direct or indirect. The selection of the direct or the indirect technique depends on the problem to be resolved. In this study, we used the direct technique, which is called Still's technique (Figure 1). This technique has limited applications, in that it is used to induce relaxation of the fascia. The case when the functional barrier to tissue in-limited in application to determine a three-dimensional pressure or pulling force and maintain 60-90 seconds until the tissue relaxes [24].

The patients were placed in the prone position on a table, with both arms extended downward and the head in a neutral position. The therapist, positioned on the pelvic side of the

Figure 1. Application of thoracolumbar fascia release technique.

patient, placed both the hands on the TLF area and stretched the fascia by applying adequate pressure. The therapist performed palpations slowly and applied pressure on the deep fascia in upward and downward, and left and right movements, in a three-dimensional pattern of rotation. The pressure point was felt when resistance occurred at the end of the resistance 90-second maintenance. The procedure was repeated 2 or 3 times in some cases.

The patients in the TLFR group and MPT group underwent MPT. MPT techniques were used for joint mobilization and relaxation, and therapeutic massage was administered to induce muscle relaxation. In some cases, therapeutic massage was administered to the pectoralis major, pectoralis minor, rotator cuff, latissimus dorsi, and teres major and minor muscles; joint mobilization and shoulder flexion, abduction, and internal or external rotation of the restriction point were performed. Furthermore, the participants performed traction and gliding movements. The TLFR group and the MPT group were administered MPT for 40 minutes, and the TLFR was administered additional TLFR for 10 minutes. Groups were administered therapy 3 times a week for 4 weeks.

Outcome measures

Shoulder pain and disability index (SPADI) and visual analogue scale (VAS) scores were measured before and after the intervention. SPADI is an assessment tool developed by Roach *et al*. [25] in 1991 to evaluate the degree of shoulder pain and disability. Eight items including two parts are separated by a total of five questions to evaluate the scale and activities of daily living disability related to pain in the upper limbs, a total of 13 evaluation items made 10 cm VAS form. The individual items were presented as percentage (%) values. Score means a higher score is made and severe pain and disability 100 points in the 0 states. The average of the score on 13 evaluation items was determined. SPADI has been reported to be a valid and reliable tool [26,27]. A more than 10-point decrease in the score was defined as a clinically minimal important change [28]. Reliability coefficients of intraclass correlation coefficient ≥ 0.89 in variety of patients and SPADI demonstrates good construct validity that correlating well other specific shoulder questionnaire [29].

VAS score was used to assess the degree of pain. A score of 0 indicated absence of pain and a score of 100 indicated very severe pain. Test-retest reliability and validity has been shown to be good in musculoskeletal pain conditions [30].

Data analysis

The general characteristics of the subjects were analyzed using descriptive statistics; groups were compared before and after the paired t-test for dependent variables. The independent t-test was performed to determine the differences in dependent variables between the groups. The statistical significance level was set at 0.05 for all the data.

Results

In the TLFR group, the degree of shoulder pain as indicated by SPADI measured after the intervention significantly differed from that before the intervention ($p<0.05$); moreover, in the MPT group, the degree of shoulder pain was significantly lower ($p<0.05$). The data of the 2 groups before the intervention significantly differed from those after the intervention ($p<0.05$). SPADI significantly differed within the groups ($p<0.05$), but not between the groups. The sum of SPADI did not differ significantly between the groups (Table 2).

The VAS scores of shoulder pain measured before the in-

Table 2. Comparison of change in the SPADI by group (N=30)

	TLFR group (n=15)	MPT group (n=15)	t[a]	*p*
SPADI (%)				
Pain				
Pre	59.33 (10.94)	54.80 (17.62)	0.84	0.41
Post	34.00 (14.02)	38.00 (12.78)		
Change	25.33 (8.47)	16.80 (7.47)	−2.92	0.01
t[b]	11.57	8.70		
p	0.00	0.00		
Disability				
Pre	47.25 (17.75)	45.16 (16.41)	0.33	0.74
Post	32.66 (16.17)	34.08 (16.91)		
Change	−14.58 (6.19)	11.08 (10.24)	−1.13	0.27
t[b]	9.12	4.19		
p	0.00	0.00		
Total				
Pre	51.88 (14.80)	48.87 (16.02)	0.53	0.59
Post	33.18 (15.02)	33.51 (14.37)		
Change	−18.69 (5.81)	15.36 (8.99)	−1.21	0.24
t[b]	12.46	6.61		
p	0.00	0.00		

Value are presented as mean (SD).
SPADI: shoulder pain and disability index, TLFR: thoracolumbar fascia release, MPT: manual physical therapy.
[a]Independent t-test, [b]paired t-test.

Table 3. Comparison of change in the VAS by group (N=30)

	TLFR group (n=15)	MPT group (n=15)	t[a]	*p*
VAS (score)				
Pre	5.48 (2.37)	4.38 (1.69)	−1.45	0.15
Post	2.57 (1.62)	2.97 (1.29)		
Change	−2.91 (1.76)	1.44 (0.93)	−2.85	0.01
t[b]	6.37	5.99		
p	0.00	0.00		

Value are presented as mean (SD).
VAS: visual analogue scale, TLFR: thoracolumbar fascia release, MPT: manual physical therapy.

tervention significantly differed from those measured after the intervention ($p<0.05$) in the both groups. After the intervention, the shoulder pain decreased significantly in the TLFR group as compared to that in the MPT group ($p<0.05$; Table 3).

Discussion

Since the origins of the osteopathic progression, the fascia is regarded as very important for achieving the best treatment outcomes [31]. Osteopathic diagnostic palpation in the case of a musculoskeletal injury or bone modifications, determination of the function of the fascia, and detection of pathophysiological conditions are necessary to determine the causes of physical dysfunction [32].

MFR facilitates mechanical and neural responses, thereby enabling a hearing physiological adaptation of the fascia through the interface system [33].

TLF is the most widely present in humans. TLF autonomic nerve fibers may be adjusted in advance by the tension of the fascia and the contraction of the smooth muscles [34]. Autonomic nerve fibers may indirectly affect the proprioceptive sense by reducing the blood flow to the muscles [35]. Proprioceptive sensory damage reduces the muscle sensitivity [36].

After MFR in the TLF of patients with chronic low back, TLF thickness increased and remained constant for 24 hours, as observed on ultrasonography [37]. A recent study showed that the TLF consists of a dense network of nerve fibers, including the nociceptive fibers, which could play a major role in back pain. The finding that most calcitonin gene-related peptide and substance P immunoreactivity fibers are located in the outer layers of the subcutaneous tissue or fascia may explain the occurrence of pain during a passive manual approach for the fascia and subcutaneous tissue [20].

Previous studies on MFR showed that TLF affects the upper extremities. In this study, TLFR was performed in 30 patients with shoulder pain to study its effects on shoulder pain and disability. MPT was effective in the reduction of pain VAS score, shoulder pain, and SPADI in both the groups; however, the effects were greater in the TLFR group than in the MPT group. The extent of shoulder disability as indicated by SPADI reduced in both the groups, and the difference between the SPADI measured before the intervention and that measured after the intervention was significant; however, the differences between the groups were insignificant.

Why was TLFR effective in reducing shoulder pain? TLF is widely distributed in the dorsal part of our body, and is connected to the latissimus dorsi fascia. TLF was considered to play a role in the relaxation of the shoulder muscles. In addition, stimulation of the autonomic nervous system, which originates in the fascia was thought to reduce shoulder pain.

Limitations of this study are a small number of study subjects and application of the technique for only a short period, imbalance of gender ratio, whether the effects of TLFR on shoulder pain and disability are long lasting could not be confirmed. Thus, we did not apply to classify the shoulder injury.

However, the effects of the application of TLFR on shoulder pain could be applied in clinical practice. Further studies will need to be performed to elucidate the effects of TLFR on functional recovery.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the authorship and/or publication of this article.

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