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Effect of myofascial release technique on pain, disability, maximum isometric contraction of the extensor muscles, and pressure pain threshold in patients with chronic nonspecific neck pain: Double blinded randomized clinical trial

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ABSTRACT

The impact of myofascial release technique alone has not been investigated in the patients with non-specific chronic neck pain. Thus, the aim of this study was to investigate the impacts of myofascial release technique on pain, disability, the maximum contraction of isometric extensor muscles of neck and pressure pain threshold in the patient with non-specific chronic neck pain compared with control group. In this clinical, randomized, double-blind trial, the patients with non-specific chronic neck pain have been entered the study by the available sampling method and have been located randomly into two groups of myofascial release therapy group, and control group. Pressure pain threshold, pain intensity, disability and isometric power of neck extensor muscles before and after intervention were registered through pressure algometer, visual analogue scale, neck disability index, and pressure biofeedback. The treatment was performed for 4 sessions and each session for 20 minutes. The paired t-tests and independent t-test were used for within group and between group comparison respectively. Comparing the mean of pain intensity, pressure pain threshold, neck disability index in the intervention group compared with control group showed significant reduction ($P < 0.05$). The strength of isometric extension of neck after intervention was improved, although it did not show significant change ($P > 0.05$). Myofascial Release is one of the effective manual therapy techniques in reducing pain, disability, improving the isometric extension strength of neck in patients with non-specific chronic neck pain.

Keywords: Non-Specific Chronic Neck Pain, Disability, Myofascial Release Technique

INTRODUCTION

Neck pain is one of the common musculoskeletal problems with the prevalence of 30 to 50% that in 1.7 to 11.5 percent of cases result in activity restriction [1]. Neck pain is responsible for many personal and social costs and the major cause of occupational disability that can cause one's refusing to work and exercise [2]. Neck pain can be created due to musculoskeletal, trauma, systemic, inflammatory diseases, neoplasm and poor posture reasons [3].

The non-invasive treatment methods of neck pain include manual therapies, physical therapy, applying ice, electrotherapy, patient education, acupuncture, non-steroidal drugs and collar [4]. In recent years using manual therapy techniques for treatment of musculoskeletal problems has been increased [5]. Various manual therapy techniques are available for patients' treatment [5, 6]. These techniques are divided into two basic groups: a group of techniques that has been designed based on joint and includes manipulation and mobilization techniques, and another group is Myofascial techniques that have been designed to effect on soft tissue [5]. Myofascial Release refers to manual massage technique that is performed for stretching the fascia and releasing bonds between fascia and skin, muscles and bones, with the aim of relieving pain, increasing the range of motion and body balance [7]. It is said that the effect of this technique can be the mechanical, neural facilitation and psycho-physiological adaptation [8].

Entangled fascia results in pain, reduction range of motion and reduction of flexibility and stability, and decrease the body's ability to confront with stress and strain [7]. Myofascial release is one of the methods of manual therapy that is used for neck pain treatment. In spite of wide use of this method, considering of previous studies showed that the impact of myofascial release technique in non-specific chronic neck pain has not been investigated. Only two studies have been found in this field that investigated the impact of this method on the patients suffering fibromyalgia [9, 10].

Castro AM et al. [2011] investigated the impacts of myofascial release technique on pain, physical performance, and postural stability in the patients suffering fibromyalgia and concluded that myofascial release techniques are raised as complementary treatment for pain and physical performance, but does not improve postural stability [9]. Castro AM et al. [2011] by investigating the impact of myofascial release therapy on pain, anxiety, sleep quality, depression, and life quality in the fibromyalgia patients also concluded that this treatment is effective in levels of anxiety, sleep quality, pain and quality of life in intervention group compared with the placebo group [10].

Previous studies mainly investigated the effect of treatment methods such as exercise therapy, massage, mobilization and manipulation on neck pain [11-13]. Some of the studies performed in this respect have also investigated the impact of manual therapies along with other common physiotherapy methods [4, 14]. Thus, the effects obtained from complementary treatments like these cannot be attributed only to one of these applied methods.

As mentioned above, the aim of this study was to investigate the effect of myofascial release technique on pain, disability, the maximum isometric contraction strength of extensor muscles and pressure pain threshold in the patient with non-specific chronic neck pain compared with control group.

MATERIALS AND METHODS

In this double-blind randomized clinical trial, the patients with non-specific chronic neck pain have entered into the study by simple available sampling method. The patients have entered the study based on the criteria of primary complaining of neck pain with or without shoulder girdle and upper limb unilateral symptoms for at least 3 months, age between 18-55 years old [15]. Mechanical neck pain is a general neck pain or shoulder girdle with mechanical features like recreation symptoms with maintaining posture or with neck movement or palpating cervical muscles [4]. The subjects were excluded from the study if they had whiplash damage occurrence in recent 6 weeks, the history of spinal tumors, cervical spine fracture or open neck surgery, detection of cervical spinal stenosis, bilateral upper extremities symptoms, or positive neurologic findings, receiving Myofascial pain treatment in the months before study, long term use of corticosteroids [16]. The suitable subjects for study, after completing and signing ethical consent form assigned into two groups of Myofascial Release therapy group [17 people] and control group [17 people] randomly. The demographic characteristics of each person including, age, gender, height, weight, and treatment group were recorded in data collection form. The patients were blinded to grouping. For the researcher to be blind, performing treatment intervention was done by one examiner and measuring all variables was done by another examiner who was not aware of patients grouping. At first in order to determine the location of pain, skin

rolling was performed by the therapist in the prone position [17]. After exact determination of the pain location, for performing general relaxation, superficial stroke massage was performed for 2 to 3 minutes on the back region to the neck and shoulders area in reciprocating and transverse way. Then the therapist focused on the pain region locally and by using myofascial release technique with pressure proper with the patient's pain tolerance. At the end of treatment session about 2 to 3 minutes surface stroke massage was performed again and treatment was ended [7]. The treatment was performed for 2 weeks and each week for 2 sessions, and each treatment session takes 20 minutes. After recording the measurements, the control group waited two weeks for treatment and at the end of two weeks the measurements were recorded again, and then they received myofascial release therapy [18]. In the myofascial release therapy group, after treatment, the variables under investigation were measured again.

Pain Evaluation: Visual Analogue Scale was used for measuring pain intensity. This scale is graded from 0 to 10 that the patient should specify his/her evaluation of existing pain on a graded line from 0 [without pain] to 10 [the most severe imaginable pain] [19].

Disability Evaluation: The patient's disability level was determined through Neck Disability Index [NDI]. This questionnaire included 10 parts and each part was scored from 1 to 5. The maximum score of disability in this questionnaire was 50 [20].

Evaluation of maximum Isometric contraction strength of Neck Extensor Muscles: For measuring the Isometric contraction strength of neck extensor muscles, the pressure biofeedback device was used. The initial cuff pressure of this device was set at 50 mmHg. The device was fixed on the wall in a way that when the patient sits on the chair, the cuff of device was located behind the occipital protuberance. The patient was asked to sit while keeping neutral position, neck with neutral lordosis, lumbar in vertical position, without contraction of the shoulder girdle muscles and only with isometric contraction of neck extensor muscles, and press the head to the cuff of device. Then the change in grade was recorded. Three movements with 2 minutes rest between them were repeated and the averages of obtained scores were recorded as the maximum isometric contraction strength of neck extensor muscles [21].

Pressure Pain Threshold Evaluation: Pressure pain threshold was measured by pressure algometer, in prone position on the involved muscle [22].

Myofascial Release Therapy Method: In this study, Skin Rolling, Cross Hand, Compression and combination techniques were used in the intervention group [17, 23].

The obtained data was analyzed by using SPSS 16 software. The paired t-tests and independent t-test was used for within group and between group comparison of the pain, disability, maximum isometric contraction strength of the neck extensor muscles and pressure pain threshold.

Findings:

The values related to the demographic variables of participants presented as mean and standard deviation (table 1). Both groups were equal in respect of demographic variables. All variables had normal distribution.

All variables in the myofascial release therapy group showed significant change after treatment ($P < 0.05$). The mean of pain intensity, neck disability index, and pressure pain threshold were reduced ($P < 0.05$). The maximum isometric contraction strength of neck extensor muscles increased ($P < 0.05$) (table 2).

Comparing the mean of all variables except the neck disability index before and after measurements of the variables in the control group, did not show significant change ($P > 0.05$) (table 2).

Comparing the mean of all variables except the neck disability index between two groups before intervention did not show significant difference ($P > 0.05$). It means that except the neck disability index, two groups matched in respect of variables under study (table 2).

Comparing the mean of all variables except maximum isometric contraction strength of the neck extensor muscles between group after intervention showed significant change ($P < 0.05$). It means that pain intensity, pressure pain threshold, and neck disability index in the intervention group have decreased compared with control group (table 2).

DISCUSSION

According to the results of present study, pain intensity, pressure pain threshold, neck disability index, and maximum isometric contraction strength of the neck extensor muscles in the myofascial release therapy group improved, while in the control group only the neck disability index showed improvement. The results of this study also showed that myofascial release therapy was more effective than control group in pain reduction, increasing pressure pain threshold, and reducing neck disability. Although this treatment method was effective in increasing maximum isometric contraction strength of the neck extensor muscles, in comparison with the control group which there was no significant difference statistically.

The findings of present study in respect of the impact of myofascial release therapy on pressure pain threshold correspond with the findings of Baker et al. study [8]. Of course the intervention used in Baker's study was different from the present study. The groups in Baker's study were classic massage group and connective tissue massage group and all samples were female. In the mentioned study the classic massage was followed by pressure pain threshold that this finding corresponds with the findings of present study. But no change was observed in the connective tissue massage group in respect of pressure pain threshold. Although in Baker et al. study classic massage had impact on pressure pain threshold, the impact was not statistically significant, while in the present study this impact was statistically significant. It seems that this difference is related to the type of intervention selected in the present study and the point that the treatment has been done specifically on the neck and shoulder girdle. The treatment sessions in the present study were 4 sessions, while it was less [one session] in Baker's study.

The findings of present study about the impact of myofascial release therapy on maximum isometric contraction strength of the neck extensor muscles correspond with the findings of Hakkinen et al. study, although in the present study the changes due to the intervention has been statistically significant and the results compared with Hakkinen's study show more impact of myofascial release therapy in the present study. The reason of this difference and the statistical significant impact might be the focus on one technique for a longer term. The findings of present study also correspond with the findings of Hakkinen et al. study in respect of the impact on pain intensity.

The findings of Levoska et al. [24] indicating the impact of heat, massage and stretching on increasing the maximum isometric contraction strength of the neck extensor muscles and reducing pain intensity support the findings of our study. The results of Jordan et al. study [25] also correspond with the findings of our study. They applied manipulation, massage, and manual stretch treatments on the patients with chronic neck pain and reported 15 percent increase in isometric flexion strength and 24 percent increase in extension strength of neck. The findings of their study correspond with the findings of present study in respect of the maximum isometric contraction strength of the neck extensor muscles improvement, but in their study in addition to passive treatment, the patients had been encouraged to perform active exercise for neck and shoulder muscles and stretching of the mentioned muscles. So, their intervention type can describe a part of their results.

The findings of Sherman et al. study [26] support the findings of present study in respect of the impact of massage treatment on pain intensity and reducing disability. Although in Sherman et al. study several groups with average time of 30 and 60 minutes massage in a week had been under treatment for once to thrice a week, the positive results had only been reported in a group that had received 60 minutes massage in a week. However, in the present study the related positive impacts were reported with less time duration [40 minutes in a week] and for two weeks [half of the time of Sherman's study]. Anyway, in the present study the intervention used was different from the Sherman et al. intervention, while in their study no description was offered about the type of massage used.

The findings of present study correspond with the findings of Chaudhary et al. study [22] in respect of the impact of myofascial release method on pain intensity and pressure pain threshold. In their study the treatment technique of transverse friction massage along with stretch have been performed on the upper trapezius muscle. The treatment place was similar to the present study. Although in their study all three myofascial release methods, cold pack, and exercise treatment were effective, the myofascial release method compared with cold pack, and exercise treatment showed more impacts.

The findings of Nitsure et al. study [27] in respect of myofascial release technique impact on pain intensity support the findings of present study. The population under their study was the patients with mechanical neck pain and with

upper extremity radiculopathy, while in the present study the patients with non-specific chronic neck pain were under treatment without radiculopathy.

It has been said about the impact of myofascial release on pain reduction that myofascial release causes change in Matrix viscosity and converts it from solid to liquid and as a result removes pressure of fascia from the pain-sensitive structures and causes returning to proper alignment [28].

The impact of pain reduction of myofascial release techniques can be explained by both spinal and supra spinal mechanisms, in a way that activating the mechanical muscle and joint receptors occur during continuous release. Myofascial release stimulates deep joint receptors by stretching the joint capsule [29]. This causes sympathetic stimulation by somatic efferent and local activation of Periaqueductal gray matter that plays the role of descending modulation [16, 30, 31]. Thus, pain control occurs at the level of the spinal level and the dorsal horn of spinal cord [29, 32].

The impact of myofascial release on disability index reduction in the patients with chronic neck pain can be due to the pain reduction, spasm reduction, tissue tension removal, tissue nutrition improvement, and removal of tissue Waste materials due to tissue blood flow increase [33]. It is assumed that the reducing pain treatments can improve the function of the neck [2]. It has been reported that neck pain impacts on movement control and can result in functional defect [34-36]. Removing the impairments existing in the tissues such as disappearance of tissue restrictions and consequently increasing range of motion, reduction of tissue tension, and hence reduction of tissues stiffness, improvement in muscle activity level due to pain reduction can result in better performance during daily activities and ultimately reduction of one's disability level [35, 37].

About the impact of myofascial release therapy method on maximum isometric contraction strength of the neck extensor muscles in the present study, it should be said that in spite of the no statistical difference existence comparing between two groups, this method has been effective in strength improvement. The reason of the impact of myofascial release therapy method on muscle strength in the present study can be related to the pain removal due to this treatment. Neck pain can result in performance defect due to movement control changes [34-36]. There are movement control changes of upper trapezius muscle and more activation of neck secondary muscles in the patients suffering chronic neck pain. Moreover, a delay is created in activating neck muscles and defect in automatic feed-forward control of cervical spine. This point results in vulnerability of neck to the accumulative micro-tears and causes pain creation [33]. The pain causes muscle inhibition through inhibitory synapses at the spinal cord level. The muscle spasm due to the pain or tissue waste materials or tissue damages can also interfere with appropriate muscle activity and practically impacts muscle power [35, 37]. Therefore, pain removal can indirectly help muscle strength improvement.

Table 1: Demographic Characteristics of People Participating in the Study

	Mean and Standard Deviation		Significance Level
	Treatment Group	Control Group	
Age	38.529 ±6.755	35.294±7.990	0.212
Height	1.652 ± 0.061	1.635±0.067	0.445
Weight	68.764±10.697	71.705± 0.393	0.393
Body Mass Index	25.191 ±3.415	26.810± 2.117	0.106

Table 2: Mean and Standard Deviation of Variables before and after Intervention in Two Groups

	Treatment Group			Control Group			Significance Level between Two Groups	
	Mean and Standard Deviation - Before	Mean and Standard Deviation -After	Significance Level*	Mean and Standard Deviation -Before	Mean and Standard Deviation -After	Significance Level	Before	After
Pain No.	**6.352±1.057	2.941±1.088	0.000	6.058±1.428	5.94±1.197	0.496	0.464	0.000
Pressure Pain Threshold	25.588±4.569	35.411±7.202	0.000	27.411±4.169	27.176±4.186	0.668	0.233	0.000
Extension Power	28.705±9.342	31.270±9.553	0.000	27.876±8.264	28.105±8.400	0.413	0.786	0.313
Disability Index	46.705±13.963	22.705±8.773	0.000	38.352±6.972	35.764±8.714	0.004	0.035	0.000

*Significance level $P < 0.05$
 **Mean and standard deviation of data

CONCLUSION

The findings of present study showed that myofascial release can be one of the effective manual therapy techniques in the treatment of patients with non-specific chronic neck pain. Myofascial release was effective in reducing pain and reduction of neck disability index and pressure pain threshold increase and can improve maximum isometric contraction strength of the neck extensor muscles through pain control. Therefore it can be proposed as a selective treatment for the patients with non-specific chronic neck pain.

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