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A RANDOMIZED TRIAL TO STUDY THE COMPARISON OF TRIGGER POINT DRY NEEDLING VERSUS KINESIO TAPING TECHNIQUE IN MYOFASCIAL PAIN SYNDROME DURING A 3-MONTH FOLLOW-UP

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ABSTRACT

Background: Managemen of myofascial pain syndrome (MPS) is a current research subject since there is a small number of randomized studies comparing different management techniques. Multiple studies attempted to assess various treatment options including trigger point dry needling and kinesiotaping. We compared the effects of trigger point dry needling and kinesiotaping in the management of myofascial pain syndome during a 3-month follow-up period.

Methods: In this prospective randomized studyin MPS patients with upper trapezius muscle trigger points, the effects of dry needling (n=28) and kinesiotaping (n=27) was compared with regard to the visual analog scale (VAS), neck disability index (NDI), and Nottingham health profile (NHP) scores measured at the weeks 0, 4, and 12.

Results: Both dry needling and kinesiotaping comparably reduced VAS scores measured at the weeks 4 and 12 and their efficacies were more remarkable at the week 12 ($p<0.05$). These interventions significantly reduced the NDI and NHP score and their effects were also more remarkable at the week 12; however, dry needling was found more effective ($p<0.05$).

Conclusion: Overall, in current clinical settings, during the management of MPS, pain can be reduced comparably by both dry needling and kinesiotaping; however, restriction in the range of motionin neck region and quality of life are more remarkably reduced by dry needling. Both dry needling and kinesiotaping can provide an increasing effectiveness up to 12 weeks.

Keywords: Myofascial pain syndrome, dry needling, kinesiotaping, pain, Nottingham health profile, neck disability index

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INTRODUCTION

Introduction Myofascial pain syndrome (MPS), which is a common chronic syndrome associated with muscle and skeletal pain, is typically diagnosed based on the identification of fascial constrictions and myofascial trigger points through the palpation of muscles [1]. Pain in MPS is caused by contracted yet tender muscle regions located at these trigger points. Regions affected by MPS include the fascia, connective tissue, and muscles throughout the body, although it tends to occur more frequently in the shoulder, lumbar, and neck regions [2, 3].

Various approaches can be used in the management of MPS either in combination or alone with varying degrees of success. These include exercise, massage, patient education, medical treatment, laser and ultrasound applications, corticosteroids, botulinum toxin, trigger point needling, myofascial release, and electrotherapy [4, 5]. Dry needling is a local treatment method that relies on the insertion of a needle directly into the trigger points without using any medication. This method has been suggested to desensitize the painful points by mechanically damaging taut muscles and trigger points, and toreduce muscle tension [6]. In a recent meta-analysis, the authors suggested that dry needling reduces pain intensity, especially with an increase in the range of motion, compared to placebo but not at the successfulness of other treatment modalities and concluded that with few studies included in that meta-analysis, it is difficult to confirm that dry needling is an effective treatment in the management of MPS [7].

In the regions of myofascial trigger points, with muscle spasm and reduced blood circulation in the taut bands. Additionally, nociceptors can be affected by several inflammatory factors and fascial contractures can also be developed. Recently, in a few studies, kinesiotaping, a popular method used in sport injuries and postoperative complications, is added to the armamentarium of strategies for the management of MPS [8]. The main goal of kinesiotapingis to increase the subcutaneous space between the skin and soft tissues to facilitate blood circulation and improve blood supply to the applied tissue [8, 9]. The studies showed that kinesiotaping improved blood and lymphatic circulation in the tissue; improved range of joint motion; decreased edema and muscle spasms; and provided effective pain relief. Despite these studies, however, it remains unclear how kinesiotaping actually exerts its effects [10-13].

In the relevant literature, no prior studies have examined the effects of trigger point dry needling and kinesiotaping in the management of myofascial pain syndrome in the same clinical settings with randomized patient groups. Therefore, the purpose of this study was to compare the effects of trigger point dry needling and kinesiotaping in the management of myofascial pain syndrome during a 12-week follow-up period.

MATERIALS AND METHODS

The present study included a total of 60 patients aged between 20 and 60 years who were diagnosed with cervical MPS associated with active trigger points on palpable taut muscle bands in the trapezius muscle at the physical therapy and rehabilitation clinic of our university [14]. A written informed consent was obtained from each patient. The study protocol was approved by the local Ethics Committee. The study was conducted in accordance with the principles of the Declaration of Helsinki.

The presence of trigger points was examined by palpation of taut muscles. The area with severe tenderness was identified by repeated palpations. A painful expression on the patient's face produced with pressure on the tender areas, a "jump and shout" response, and the radiation of pain to a distant area (neck, back, shoulder, etc.) indicated the location of trigger points. The study only included patients who were diagnosed with cervical myofascial pain syndrome with an onset of symptoms for more than three months. Patients with fibromyalgia syndrome, cervical disc lesion, radiculopathy, kyphoscoliosis, myelopathy, recent trigger point injection, inflammatory musculoskeletal system disorder, history of psychiatric and systemic disorders, bleeding diathesis, pregnant women, patients with a past history of brain or shoulder surgery, and patients with an inability to cooperate were excluded. In addition, patients who participated in a physical therapy program for MPF within the past six months were excluded. Sociodemographic features (age, sex, educational and occupational status, and smoking history) were recorded. The patients were evaluated at baseline, four weeks, and 12 weeks using a visual analogue scale (VAS), neck disability index (NDI), and the Nottingham health profile, and the data were recorded.

Randomization

By accepting the VAS score as the main numeric parameter and assuming a difference of 2 points with 2.5-point standard deviation of VAS score, according to the unpublished data in our outpatient service, the number of cases (i.e. sample size=25) admitted for each group was calculated with the "Sample Size for Analysis of Variance Program" module of the online Computer Program to Calculate Sample Size Requirement in the Analysis of Variance (http://www.statstodo.com/SSizAOV_Pgm.php) after acceptance of desired statistical power at 80% ($1-\beta = 0.8$) at a significance level of 5% ($\alpha < 0.05$). Considering drop-out of patients, we randomized a total of 60 patients into dry needling and kinesiotaping groups (n=30 in each of the groups). The patients did not receive any analgesic therapy other than paracetamol, if necessary. The assessments at baseline and during the treatment were carried out by a blind specialist.

Kinesiotaping technique

The patients in the kinesiotaping group received kinesiotaping at three days intervals for two weeks. The kinesiotaping method involved the use of a kinesiologic tape with a width of 0.5 mm and a length of 15-20 cm (PINO, Pharmazeutische Präparate GmbH, Germany). The patient was placed in a relaxed and upright sitting position before the procedure and was instructed to perform contralater-

al neck flexion and ipsilateral rotation. The tapes were applied to clean and dry skin. The proximal 4-5 cm portion of the tape was applied to lower margin of the acromion with maximum stretching and extended to the hair line along the course of the upper fibers of the trapezius muscle (the inhibition technique was used according to the KenzoKase method) (Fig. 1).

Picture 1: Kinesio Taping technique

Dry Needling

The trigger points on the trapezius muscle in the dry needle group were identified with palpation and marked with a pen, and the skin was cleaned with an appropriate antiseptic agent. Three 0.25x25 mm sterile acupuncture needles were inserted at the trigger points, a few millimeters apart. It was observed that the taut muscle grabbed onto the needle while entering the muscle (which is felt easily while attempting to repel the needle). Therefore, the needle was left in the muscle for some more time (10-20 minutes) and manual stimulation was produced (at the trigger points) by rotating the needle counterclockwise. The needle was left in place until the muscle released the needle, after which it was easily withdrawn. This method was applied twice weekly for two weeks (Fig. 2).

Picture 2: Dry needle technique

Questionnaires Employed

VAS

The pain sensation at the active trigger points was assessed before and after therapy using the visual analogue scale (VAS) using a 10 cm-long chart from 0 to 10 points. Zero points indicated no pain and ten points indicated the most severe pain ever experienced.

Neck Disability Index (NDI)

The Neck Disability Index (NDI) was developed to evaluate the patients' perception related to their neck disability. This is a ten-item questionnaire filled-out by the patients with neck pain to measure the alteration in their functional status. The concentration, driving, headaches, lifting, pain, personal care, reading, recreation, sleeping, and work of the patients were evaluated, as from 0 to 5, with 0 representing no pain, and 5 as the highest level of pain. The sum of these scores was calculated as the NDI score. With the NDI, with a high level of reliability, validity, and internal consistency, the pain and disability levels over time can be accurately detected. As such, a change of ten points or more over time is indicative of a clinically significant change in pain and disability [15, 16].

Nottingham Health Profile (NHP)

This scale evaluates emotional, social, and physical health problems perceived by the patient and it comprises six subareas including energy level (3 items), pain (8 items), physical abilities (8 items), sleep (5 items), emotional reaction (9 items), and social isolation (5 items). The questionnaire contains a total of 38 questions each answered as "Yes" or "No". The questionnaire examines the complaints at the time of administration. In scoring of NHP, the "No" answers are scored as 0 and the "Yes" answers are scored as 1 point. The addition of the scores yields a total score between 0 and 100 points. Higher scores approximating 100 points indicate poor health perception [17].

Statistical analysis

Clinical data of the study groups were presented as mean ± SD or percentage. For the analyses of the clinical data, IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp, Armonk, NY, USA) was used. In the assessment of normality, Kolmogorov-Smirnov test was used. The repeated measures ANOVA was used for the comparisons of data measured at different time points, followed by the Tukey test for post hoc pairwise comparisons. In addition, t-test was used to compare the study variables between the groups. Statistical differences were determined at a 95% confidence level ($p = 0.05$). A p value of less than 0.05 was considered statistically significant.

RESULTS

Two and three patients in the dry needling groups, kinesiotyping groups, respectively, did not complete the study because of loss to follow-up. Analyses of data were performed with 27 KT group and 28 mechanical needling group. Table 1 presents the selected demographic and clinical data of the dry needling and kinesiotaping groups. The age, educational status, occupation smoking, and restriction in the range of motionin neck region of study groups were found similar ($p>0.05$).

Table 1: Selected demographic and clinical data of the dry needling and kinesiotaping groups.

	Dry needling (n=28) %	Kinesio taping (n= 27) %	Significance
Gender Female Male	 21(%75.0) 7 (%25.0)	 24 (%88.9) 3 (%11.1)	p=0.295
Education Middle school High school University	 8 (%28.6) 8 (%28.6) 12 (%42.9)	 8 (%29.6) 6 (%22.2) 13 (%48.1)	p= 0.857
Occupation Yes No	 12 (%42.9) 16 (%57.1)	 13 (%48.1) 14 (%51.9)	p= 0.694
Smoking Yes No	 8 (%28.6) 20 (%71.4)	 8 (%29.6) 19 (%70.4)	p = 0.931
Neck disability Yes No	 6 (%21.4) 22 (%78.6)	 6 (%22.2) 21 (%77.8)	p = 0.940

Figure 1 presents the VAS scores measured at the weeks 0, 4, and 12 in the dry needling and kinesiotaping groups. In the dry needling and kinesiotaping groups, the VAS scores measured at the week 4 were significantly lower than those measured at the week 0 (5.5 ± 1.2 vs. 7.1 ± 1.2 in the dry needling group, and 5.7 ± 1.2 vs. 7.1 ± 1.2 in the kinesiotaping group; p<0.05). In the dry needling and kinesiotaping groups, the VAS scores measured at the week 12 were significantly lower than those measured at the week and 4 (3.8 ± 1.1 vs. 5.5± 1.0 in the dry needling group, and 4.2± 1.3 vs. 5.7± 1.1 in the kinesiotaping group; p<0.05). No significant differences were found between the dry needling and kinesiotaping groups with regard to the VAS scores measured at the weeks 0, 4, and 12 (p>0.05).

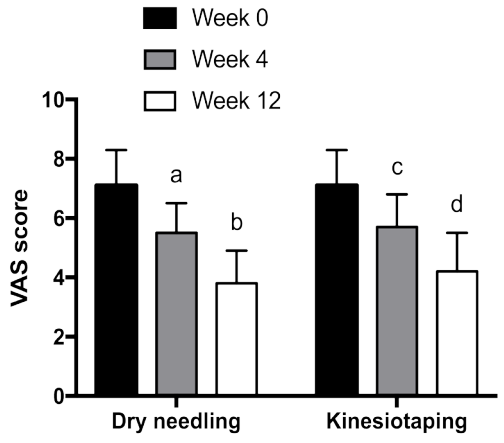

Figure 1: Visual analog scale (VAS) scores measured at the weeks 0, 4, and 12 in dry needling and kinesiotaping groups.

a,cP<0.05 vs. week 0.

b,dP<0.05 vs. week 4.

Figure 2 displays the NDI scores measured at the weeks 0, 4, and 12 in the dry needling and kinesiotaping groups. In the dry needling and kinesiotaping groups, the NDI scores measured at the week 4 were significantly lower than those measured at the week 0 (12.6 ± 5.6 vs. 18.4±7.0 in the dry needling group, and 15.9±5.6 vs. 19.7±5.8 in the kinesiotaping group; p<0.05). In the dry needling and kinesiotaping groups, the VAS scores measured at the week 12 were significantly lower than those measured at the week and 4 (7.6±3.7 vs. 12.6±5.6 in the dry needling group, and 11.1±5.3 vs. 15.9 ± 5.6 in the kinesiotaping group; p<0.05). No significant difference was found between the dry needling and kinesiotaping groups with regard to the VAS scores measured at the week 0 (p>0.05); however, the NDI scores measured at the weeks 4 and 12 in the dry needling group were significantly lower compared to the those in the kinesiotaping group (p<0.05).

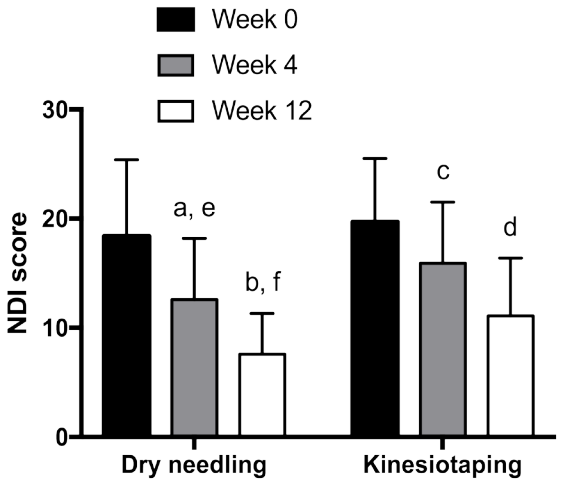

Figure 2: Neck disability index (NDI) scores measured at the weeks 0, 4, and 12 in dry needling and kinesiotaping groups.

a,cP<0.05 vs. week 0.

b,dP<0.05 vs. week 4.

e,fP<0.05 vs. kinesiotaping group.

Figure 3 shows the NPH scores measured at the weeks 0, 4, and 12 in the dry needling and kinesiotaping groups. In the dry needling and kinesiotaping groups, the NDI scores measured at the week 4 were significantly lower than those measured at the week 0 (142.9 ± 77.9 vs. 215.5 ± 105.4 in the dry needling group, and 219.1 ± 103.9 vs. 259.8 ±117.8 in the kinesiotaping group; p<0.05). In the dry needling and kinesiotaping groups, the VAS scores measured at the week 12 were significantly lower than those measured at the week and 4 (94.5±52.9 vs. 142.9 ± 77.9 in the dry needling group, and 135.7±62.1 vs. 219.1 ± 103.9 in the kinesiotaping group; p<0.05). No significant difference was found between the dry needling and kinesiotaping groups with regard to the VAS scores measured at the week 0 (p>0.05); however, the NDI scores measured at the weeks 4 and 12 in the dry needling group were significantly lower compared to the those in the kinesiotaping group (p<0.05).

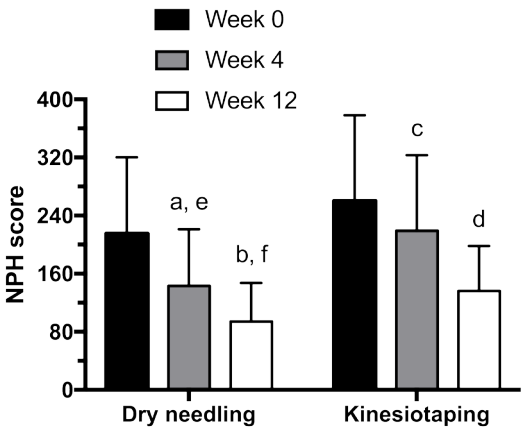

Figure 3: Nottingham Health Profile (NHP) scores measured at the weeks 0, 4, and 12 in dry needling and kinesiotaping groups.

a,cP<0.05 vs. week 0.

b,dP<0.05 vs. week 4.

e,fP<0.05 vs. kinesiotaping group.

DISCUSSION

Dry needling and kinesiotaping applied to participants with MPS was associated with better and clinically meaningful results for pain, mechanical hyperalgesia, range of cervical motion, neck muscle strength, and neck disability in the short term and at 12-week follow-up. The current study shows that dry needling and kinesiotaping is a safe form of treatment for MPS, providing preferable clinical advantages in the improvement of mechanical hyperalgesia, active cervical range of motion and quality of life in addition to the reduction of pain. Althoug dry needling and kinesiotaping increasingly improves the clinical manifestations of MPS patients with very meaningful clinical differences; the current study is limited by the duration of the follow-up only up to 12 weeks after intervention. Overall, both dry needling and kinesiotaping decreases pain comparably, dry needling was more successful for reducing other manifestations of MPS including perceived neck disability and quality of life.

MPS as a common non-articular local musculoskeletal pain syndrome caused by myofascial trigger points located in the muscle, fascia, or tendinous insertions [18]. These trigger points can be either active, tender, and spontaneously painful or latent. MPS patients had also painful restriction of motion, stiffness, referred pain patterns, various postural habits, lack of exercise, sleep disorders, and autonomic abnormalities [18-21].

Although there are many treatment modalities for the management of MPS, including injections with lidocaine or granisetron, traditional Thai massage, self-myofascial release, and monochromatic infrared photo energy [5], dry needling and kinesiotaping has become popular in recent years. Research on the effects of these techniques has increased gradually. In arecent study, Cerezo-Téllez et al. (2016) compared the efficacy of deep dry needling with passive stretching applied to participants with chronic non-specific neck pain attributed to MPS [22]. They suggested that dry needling was associated with better and clinically meaningful results for pain and other clinical findings in the short term and at six months follow-up. In are cent study [23], the impact of diameter of needles on the effect of dry needling treatment inPMS patients with chronic lumbar pain. In that study, although all procedures have decreased pain, efficacy of treatment with larger needles (0.9-mm diameter) was better than that of smaller ones (0.5-mm diameter). Tekin et al. (2013) compared the efficacy of dry needling and sham dry needling in the treatment of MPS [24]. They suggested that patients who were treated with dry needling presented meaningful improvement with regard to pain and QoLassessment. Yeganeh et al. (2016) compared the effects of the combined use of dry needling and muscle energy technique on the upper trapezius latent myofascial trigger point in MPS patients. They suggested that although dry needling was effective, the addition of muscle energy technique increased its effectiveness [25]. Diracoglu et al. (2012) investigated theeffectiveness of dry needling compared to sham dry needling for the treatment of temporomandibular myofascial pain. They found that dry needling is an effective treatment method in relieving the pain and tenderness of myofascial trigger points [26]. Özden et al. (2016) determined sympathetic nervous system activity in MPS patients undergone dry needling by using the sympathetic skin response method [27]. In that study, dry needling was found that dry cleaning diminished pain parameters and sympathetic skin responses in MPS patients. According to results of other new studies dry needling used for the management of MPS indifferent regions of body, this technique was found effective for reduction pain intensity and other accompanying findings [28,29,30,31,32]

Öztürk et al. (2016) evaluated the short- and mid-term effects of kinesiotaping in MPS patients with trapezius muscle trigger points[33]. They found that there were improvements in pain and upper trapezius muscle strength compared to the sham kinesiotaping. In a study with MPS patients with the myofascial pain and range of the motion of temporomandibular joint, kinesiotaping successfully improved clinical findings [34]. Ay et al. (2016) compared the effects of kinesiotaping with its sham type and demonstrated that kinesiotaping is successful for the improvement of findings including pain, pressure pain threshold, cervical range of motion, and neck disability[35]. Halski et al.(2015) investigated short-term effects of kinesiotaping and cross taping applications in the treatment of latent upper trapezius trigger points in MPS patients. Their findings support that although these methods reduce pain intensity, there is no meaningful change in the resting bioelectrical activity and tone of the muscle[36]. Chao et al. (2016) assessed the effects of manual pressure release with or without kinesiotaping on muscle stiffness andthe pressure pain threshold with the vibration amplitude/frequency of muscle contraction in PMS patients with trigger pointsin upper trapezius muscle[37]. They found that both modalities lead to similar improvements in pain intensity after intervention and follow-up.

Considering the findings of recent studies including dry needling and kinesiotaping interventions, overall, the re-

sults of the current study are consistent with the those findings concerning the effectiveness of currently studied dry needling and kinesiotaping procedures for the improvement of direct and indirect pain-related complaints of patients after intervention and follow-up. It has been proposed that with appropriate applications of both dry needling and kinesiotaping can lead to improvement of pain and related findings, they can be chosen after informed discussion with the patients. Overall, according to the results of our study comparing first time the dry needling and kinesiotaping in the management of neck muscle trigger points in PMS patients, dry needling can considered partially more effective than kinesiotaping. Considering limitations of our study, this need to be confirmed by other studies comparing their effect in different regions of body. The most important drawback of this study is the limited number of subjects and the lack of long-term follow-up. Secondly, there was no natural recovery group used as control groups. Additionally, for better access to the trigger points in several type of subjects with varying muscle morphology, different needles could have been used. Changes in the VAS, NDI, or NHP evaluation may be due to the outcome of the natural course of the disease itself. Second, this study was designed especially for patients with neck myofascial pain. Whether the results apply to myofascial pain of other parts remain unclear.

CONCLUSION

Continuing research is a need to reach the optimal treatment modalities producing acceptable the year and controllable clinical outcomes and in for clinical practice, dry needling have a merit for recommendation as a treatment option with predictable pain relief up to 12-weeks-period. Within the limitations of this randomized study, the following conclusions were drawn: In current clinical settings, dry needling and kinesiotaping, in order of effectiveness, reduces the complaints of patients and increased their quality of life. Both dry needling and kinesiotaping have an increasing effectiveness up to 12 weeks.

Abreviations

MPS: Myofascial pain syndrome
VAS: Visual analog scale
NDI:Neck disability index
NHP:Nottingham health profile

Conflict of interest

The authors declare that there is no conflict of interest

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