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Short-term effects of kinesio taping and positional release technique: in subjects with lumbar myofascial pain syndrome

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To investigate the effects and outcome relationships of positional release technique (PRT) alone, kinesio tape (KT) alone or in combination between PRT and KT in subjects with lumbar myofascial pain syndrome. 60 male and female patients randomly assigned in four groups (Group A, B, C and D). With age ranged from 27 to 35 years old diagnosed with lumbar myofascial pain syndrome had participated in this study. Intervention: each group consisted of 15 patients. Group (A) received PRT, Group (B) received KT, Group (C) received PRT technique and KT and Group (D), control group received sham KT. Main measures: pre and post treatment (at 4th day) 1-Visual Analog Scale (VAS), 2-Pressure Pain Threshold (PPT) 3- Oswestry disability index (ODI). RESULTS: Post treatment there was no significant difference in PPT, ODI and VAS between group I and group II ($p=1$). Group III showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group I, II and IV ($p=0.001$). Group I and Group II showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group IV ($p=0.001$). Combination between PRT and KT was more effective in reducing pain level, improving pressure pain threshold and improving functional disability than PRT or KT alone in treating patients with lumbar myofascial pain syndrome.

Keywords: Positional release technique, kinesio tape, myofascial pain syndrome.

INTRODUCTION

Myofascial pain syndrome (MPS) is a common form of pain arising from muscles or related fascia (Giamberardino et al., 2011), usually associated with myofascial trigger points (MTrPs) which are hyperirritable spot and painful on compression or stretching (Simons et al., 2004; Travell et al., 1983). Symptoms of MTrPs include taut bands in the muscles, weakness or tenderness at the affected spot, limited range of motion (ROM), hot and red skin (Lavelle et al., 2007). Local or referred pain, limited mobility, autonomic dysfunctions and local twitch response in the affected muscle (Giamberardino et al.,

2011; Radford et al., 2004) that can further result in allodynia at the site associated with peripheral and central sensitization (Grieve et al., 2013). Consequently, patients with MPS can have impairment of their work, social activities and quality of life (Oliveira et al., 2013). Management of MPS can be based on the proposed mechanisms of causing MTrPs. Travell and Simons (1983) presumed that excessive acetylcholine release occurring in a muscle contraction can lead to a perpetuated shortening of the muscle and development of MTrPs. Based on this, inactivating TrPs is a potential treatment option (Simons et al., 2004; Travell et al.,

1983). Treatment strategies for MPS are primarily divided into invasive and non-invasive treatment techniques. The non-invasive treatment techniques include medical treatment, electrotherapy, cold spray/stretching, manual therapy, Kinesio-taping (KT) and massage (Lavelle et al., 2007). Positional release therapy (PRT) is a method of total body evaluation and treatment using tender points (TPs) and a position of comfort (POC) to resolve the associated dysfunction. PRT is an indirect (the body part moves away from the resistance barrier, i.e., the direction of greatest ease) and passive (the physiotherapist performs all the movements without help from the patient) method of treatment (Prasant et al., 2010). In this technique, tissues are placed in a Position of comfort for a brief period (90 sec) to resolve the associated dysfunction. PRT, in the shorten position, decreases gamma and alpha neuronal activities and resets the muscle spindle mechanism of the affected tissue, and thus helps improvement in vascular circulation and removal of the chemical mediators of inflammation (Speicher et al., 2006; Al-shawabka et al., 2013; Singh et al., 2014). Primary goal for the therapist is relieve taut bands, trigger points and tender points for pain relief. Secondary goal is to reduce the rate of recurrence. It has been said that PRT along with exercise reduces pain and recurrence (Speicher et al., 2006). Kinesiology Tape (KT) is an adhesive tape with unique stretchable characteristics. KT is made from a thin elastic adhesive material that can be stretched from 120-140% creating a dynamic flexible tape (Preece et al., 2016; Lee et al., 2012). Recently, Wu et al., (2015) suggested Kinesio taping as a possible therapeutic modality for myofascial pain. KT activates the gate control mechanism and descending inhibitory mechanisms through sensory stimuli (Parreira et al., 2014; Kaya et al., 2010; Iglesias et al., 2009). The effects of KT hypothesized by 1. Increasing local blood and lymph circulation, 2. Reducing local edema 3. decreasing pain and muscular spasm 4. Increasing the range of motion (ROM) 5. Strengthen weakened muscles 6. Control joint instability and postural alignment 7. Reorganizes the possible articular disarrangements (Kaya et al., 2010; Iglesias et al., 2009; Bassett et al., 2010; González et al., 2009).

MATERIALS AND METHODS

Sixty subjects suffering from active trigger points of iliocostalis lumborum and quadrates

lumborum muscles bilaterally. Patients were randomly assigned into 4 groups A, B, C and D using the sealed envelope method of randomization. Patients were recruited from the Faculty of Physical Therapy, Cairo University. All patients had signed a consent form as an agreement for participation in the study. Research proposal was approved from the ethical committee.

1- Group I (n=15) positional release technique was applied over trigger points. It was applied 3 times per session, for 2 sessions

2- Group II (n=15) kinesio tape was applied over trigger points was changed every 3 days with one day off

3- group III (n=15) positional release technique and kinesio tape was applied over trigger points of iliocostalis lumborum and quadrates lumborum muscles bilaterally,

4- Group IV (n=15) control group. Was applied shame tape

Inclusion criteria was patient with lower back myofascial pain syndrome, subjects with active trigger points in iliocostalis lumborum muscle and quadrates lumborum muscle bilaterally, age of the patients ranging from 27 to 35 years. Exclusion criteria was history of lumbar spine surgery. History of lumbar radiculopathy or myelopathy determined by their primary care physician, non-rheumatologic diseases as multiple sclerosis, thyroid dysfunction and chronic infections, Rheumatologic conditions such as, mild systemic lupus erythematosus, Polyarticular osteoarthritis, rheumatoid arthritis and advanced lumbar spine degenerative disease, fibromyalgia.

Treatment procedures:

Positional release technique:

Iliocostalis lumborum.

-Position the patient prone. The therapist stands on the involved side. Locate the area of greatest restriction (iliocostalis lumborum trigger point) and ease with one hand on either side of involved region.

-Extend the spine through elevation of the trunk and hip extension and do release by approximating specifically above and below the area which was most involvement.

- hold 90 seconds for each one and repeat three times per session (D'Ambrogio et al., 1997; Deig, 2001) for 2 sessions every other day.

Quadratus lumborum

The patient is prone with the trunk laterally flexed toward the tender point side. The therapist stands on the side of the tender point. The therapist places his knee on the table and rests the patient's affected leg on the therapist's thigh. The patient's hip is extended and abducted, and slight rotation is used to fine-tune (D'Ambrogio et al., 1997 and Deig, 2001).

Kinesio tape:

-Locate the area of greatest restriction (iliocostalis lumborum and quadratus lumborum trigger points).

-Kinesio tape (star technique) is applied bilaterally over the trigger points on the iliocostalis lumborum and y band for quadratus lumborum is changed every 3 days with one day off (Kase et al., 2003).

Evaluation Parameters

Visual Analog Scale

The visual analog scale (VAS) is a widely used scale developed by Price et al., (1983) to assess the severity of pain felt by a patient. VAS is a tool with a 100 mm horizontal line bounded by "no pain" on the left and "worst pain possible" on the right. Pain VAS response to manual palpation of the trigger point was recorded (Bijur et al., 1997).

Pressure Pain Threshold/Algometer (Wagner instruments Greenwich)

The Pain Pressure Threshold is an instrument that objectively measures the pain threshold and pain tolerance, the user can apply the desired pressure by holding the handset. The initial pressure at which the patient felt pain was recorded in kilograms. The procedure was repeated 3 times at intervals of 60 seconds to evaluate the mean kilogram pressure pain threshold (Han et al., 2001; Hong, 1994). The high reliability, reproducibility, and validity of the PPT have already been demonstrated in numerous studies (Kinser et al., 2009).

Table 1. Comparison of the mean age, weight, height, BMI and sex distribution between groups.

	Group I	Group II	Group III	Group IV		
	Mean±SD	Mean±SD	Mean±SD	Mean±SD	F- value	p- value
Age (years)	30.13± 2.55	31± 2.53	30.66± 2.22	31.2± 2.11	0.58	0.62
Weight (kg)	82.06± 2.05	81.93± 3.03	82.4± 2.79	83± 2.85	0.46	0.71
Height (cm)	169.33± 3.65	168.2± 3.32	168.26± 2.01	170.46± 3.13	1.78	0.16
BMI (kg/m ²)	28.64± 1.17	28.96± 0.95	29.1± 0.9	28.58± 1.35	0.75	0.52
Males/females	7/8	8/7	6/9	6/9	($\chi^2=0.74$)	0.86

SD, Standard deviation; χ^2 , Chi squared value; p value, Probability value.

Oswestry disability index

Functional disability of each patient was assessed by Oswestry disability index .It is valid and reliable tool. It consists of 10 multiple choice questions for back pain, patient select one sentence out of six that best describe his pain. Higher scores indicate great pain. (Scores (0.0-20%) minimal disability, Scores (20- 40%) moderate, Scores (40-60%) severe, Scores (60-80%) crippled, Scores (80-100%) patients are confined to bed (Fair et al., 2000).

Statistical analysis

Descriptive statistics and MANOVA-test were conducted for comparison of subject characteristics between groups. Chi-squared test was used for comparison of sex distribution between groups. Normal distribution of data was checked using the Shapiro-Wilk test for all variables. Levene's test for homogeneity of variances was conducted to test the homogeneity between groups. Mixed MANOVA was performed to compare within and between groups effects of treatment on PPT, ODI and VAS between the four groups as between group comparison and between pre and post treatment in each group as within group comparison. Partial squared eta was considered as the effect size. Post-hoc tests using the Bonferroni correction were carried out for subsequent multiple comparison. The level of significance for all statistical tests was set at $p<0.05$. All statistical measures were performed through the statistical package for social studies (SPSS) version 22 for windows.

RESULTS

Subject characteristics:

Table 1 showed the subject characteristics of the four groups. There was no significant difference between groups in the mean age, weight, height and BMI ($p>0.05$). Also, there was no significant difference in sex distribution between groups ($p>0.05$).

Table 2. Mean PPT, ODI and VAS pre and post treatment of group I, II, III and IV.

	Group I	Group II	Group III	Group IV	P-value					
	Mean±SD	Mean±SD	Mean ±SD	Mean±SD	I vs II	I vs III	I vs IV	II vs III	II vs IV	III vs IV
PPT (kg/cm²)										
Pre	0.79 ± 0.2	0.73 ± 0.18	0.73 ± 0.18	0.79 ± 0.2	1	1	1	1	1	1
Post	1.66 ± 0.26	1.68 ± 0.18	2.15 ± 0.16	0.84 ± 0.17	1	0.001*	0.001*	0.001*	0.001*	0.001*
	p = 0.001*	p = 0.001*	p = 0.001*	p = 0.46						
ODI (%)										
Pre	36.53± 2.41	36.93 ± 1.86	36.73 ± 1.48	36.93 ± 2.08	1	1	1	1	1	1
Post	24.66± 1.95	25.2 ± 1.52	19.86 ± 0.74	36.33 ± 2.12	1	0.001*	0.001*	0.001*	0.001*	0.001*
	p = 0.001*	p = 0.001*	p = 0.001*	p = 0.17						
VAS										
Pre	8.38± 0.39	8.21 ± 0.23	8.38 ± 0.39	8.21 ± 0.23	0.92	1	0.92	0.92	1	0.92
Post	6.28± 0.4	6.31 ± 0.35	5.11 ± 0.14	7.79 ± 0.18	1	0.001*	0.001*	0.001*	0.001*	0.001*
	p = 0.001*	p = 0.001*	p = 0.001*	p = 0.001*						

SD, standard deviation; p-value, level of significance; *Significant

Effect of treatment on PPT, ODI and VAS

Mixed MANOVA revealed that there was a significant interaction of treatment and time (Wilks' Lambda=0.03; $F(9,131.57)=42.58$, $p=0.001$, $\eta^2=0.66$). There was a significant main effect of time (Wilks' Lambda= 0.01; $F(3, 54)=1204.31$, $p=0.001$, $\eta^2=0.98$) There was a significant main effect of treatment (Wilks' Lambda=0.07; $F(9,131.57)=26.93$, $p=0.001$, $\eta^2=0.57$). Table 2 showed descriptive statistics of PPT, ODI and VAS as well as the significant level of comparison between groups and significant level of comparison between pre and post treatment in each group.

Between group comparison

There was no significant difference between the four groups in all parameters pre-treatment ($p>0.05$). Post treatment there was no significant difference in PPT, ODI and VAS between group I and group II ($p=1$). Group III showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group I, II and IV ($p=0.001$).

Group I showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group IV ($p=0.001$). Group II showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group IV ($p=0.001$).

Within group comparison

Comparison between pre and post treatment within the four group revealed that a significant increase in PPT and a significant decrease in ODI and VAS of group I, II and III post treatment compared with that pre-treatment in ($p=0.001$); while group IV showed a significant decrease in VAS post treatment compared with that pretreatment in ($p=0.001$) with no significant difference in PPT and ODI between pre and post treatment ($p>0.05$).

DISCUSSION

Sixty patients with active trigger points of muscles bilaterally participated in this study to investigate the short term effect of PRT and KT. The PPT, ODI and VAS measured pre and post treatment (at 4th day). Our study showed that using KT, had significant increase in PPT and significant decrease in ODI and VAS compared with that of group IV (control group) and post

treatment compared with that pretreatment. In respect to the results of the present study, after the suggested period of treatment other studies had similar results (Halski et al., 2015; Sip et al., 2013; Hashemirad et al., 2016). In line with the present study (Halski et al., 2015) who compare the effects of Kinesio Taping and cross taping application in the treatment of latent upper trapezius trigger points and measured pain intensity (VAS) immediately, after tape removal 3 days later and after 24 hours their results showed that the use of kinesiotape and cross tape statistically significantly decreased the pain. The result of current study coincided with the result of (Sip et al., 2013) who measured pain intensity immediately after tape application (on myofascial trigger points in trapezius muscle), after two hours, and after two days and showed that pain after taping had significantly decreased. The result of our study also was supported by (Hashemirad et al., 2016) who demonstrated the effects of KT on pain and hip joint range of motion (ROM) in individuals with myofascial trigger points in the piriformis muscle and pain intensity was measured immediately after tape application, after 72 hours suggested that KT application effective for pain relief and increasing ROM in patients with myofascial trigger points in the piriformis muscle. The results of our study showed that in the group of subjects who underwent PRT showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group IV ($p = 0.001$) and post treatment compared with that pre-treatment. The results of this study come in agreement with the results of (Mohammadi Kojidi et al., 2016) who stated that PRT is an effective intervention for reduction of pain and improvement of PPT along 3 treatment session in patients who present with Myofascial Trigger Points of the Upper Trapezius Muscle in Computer Users. Kelencz et al., (2011) showed that confirmed the assumptions that the PRT seems to relieve the muscle spasm and restore the appropriate painless movement and the tissue flexibility; the relaxation of tensioned muscle fiber promotes normalization of local vascularization and decreased pain, caused by ischemia; and the action of PRT on the nociceptive system can be exercised through the relaxation of the surrounding tissues and the consequent improvement in the vascular and interstitial movement. We did not find any studies that would compare the effect of positional release and taping and the combined effect of both However (Alagesan et al., 2012) in their study compared

the effect of positional release therapy and taping on unilateral upper trapezius tender points. The results of the study showed that conventional treatment alone and in combination with taping or PRT—statistically significantly reduced pain intensity in the subjects' upper trapezius tender points, and the comparison of the findings between the groups showed that Conventional treatment with PRT and conventional treatment with Taping are equally effective in as like the conventional treatment alone. According to the result of our study we showed significant increase in PPT and significant decrease in ODI and VAS compared with that of group I, II and IV ($p=0.001$). So the combination between PRT and KT is recommended for treatment of myofascial pain syndrome.

Limitations of the study

Among the limitations of the study was the fact that the assessor was not blind to the treatment type. Future studies can be carried out with long follow up, double blind procedure, and the use of other outcome measures such as range of motion and sonography for determining thickness of muscle trigger points.

CONCLUSION

Combination between PRT and KT was more effective in reducing pain level, improving pressure pain threshold and improving functional disability than PRT or KT alone in treating patients with lumbar myofascial pain syndrome.

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest".

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AUTHOR CONTRIBUTIONS

All authors contributed equally in all parts of this study.

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