A Study on the Effect of Manual Therapy on Physical Function Improvement in Middle-Aged Women with Lumbago

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KEYWORDS

Lumbago, Middle aged woman, Manual therapy, Joint range of motion, Low back pain disability function index

ABSTRACT

Most people experience lumbago at least once in their lifetime. In particular, it was found that lumbago prevalence was high in women experiencing pregnancy and childbirth. However, lumbago is difficult to be cured and has a high recurrence rate. This study, accordingly, investigated the effects of easily-accessible manual therapy on lumbago and physical function in middle-aged women. Subjects were randomly assigned to an experimental group to receive manual therapy and a control group to receive hyperthermia, and the Oswestry Disability Index (ODI) and joint range of motion were measured and analyzed. The results showed a positive effect on physical function improvement and back pain reduction in the experimental group to which manual therapy was applied, supporting that manual therapy is an alternative therapy that can help reduce lumbago and improve physical function in middle-aged women.

1. Introduction

Lumbago is related to weakness and structural changes in hip muscles and decreased range of motion of hip joint (Esola et al., 1996; Leinonen et al., 2000). Muscles in a state of continuous tension contract due to absence of normal movement for a long time, or cause adhesion of fascia and tissue surfaces without separation. These lead to difficulty in contraction and relaxation of muscles and limited range of motion of joints, causing pain in the body (Hong & Kim, 2017). In addition, chronic lumbago has been shown to be highly related to lumbar instability (Panjabi, 2003). In particular, the transversus abdominis and multifidus, which are located in the deepest part of the abdomen, form intra-abdominal pressure through contraction and play the most important role in stabilizing the trunk through the force of pulling the back of the spine. However, in patients who recovered from acute lumbago, the multifidus did not heal spontaneously, and the frequency of lumbago rehabilitation was high, and atrophy of the transverse abdominis and multifidus was reported in patients with chronic lumbago (Moseley, Hodges, and Gandevia 2002).

Patients with lumbago usually rely on medications, injections, and acupuncture physical therapy in the hospital. However, patients with chronic pain who experienced no treatment effects even with modern medical technology often try complementary and alternative therapy (Han, 2019). Complementary and alternative therapy is characterized by holistic care and has the advantages of preventing disease, reducing drug side effects, and reducing medical expenses (Jeong, 2012). Manual therapy is a world-wide complementary and alternative therapy that relieves muscle tension through massage, and smooth communication with the therapist during the session is possible (Lee, 2022).

It has been reported that myofascial release therapy, a type of manual therapy, helps to reduce body pain and restore degraded body functions by applying stretching and massage to the fascia surrounding muscles (Castro et al., 2011). In addition, it has been reported that, in developed countries such as the United States and Canada, the satisfaction of patients who choose complementary and alternative therapy as Lumbago's treatment is three times that of those who choose medical treatment (Hertzman-Miller, 2002). Despite these reports on the alleviating effect of manual therapy in pain patients, studies using only manual therapy in lumbago patients have been limited. The purpose of this study was, therefore, to investigate the effect of myofascial release manual therapy on lumbago and physical function in middle-aged women, a life cycle with the highest prevalence of lumbago. In addition, we provided academic evidence for accessible manual therapy to be widely used for patients with chronic lumbago, excluding those who absolutely need medical treatment such as surgery.

2. Literature Review

Manual therapy treats abnormal conditions of muscles such as weakness, shortening, and imbalance. Myofascial relaxation therapy, a kind of manual therapy was reported, through massage and stretching

in parallel, to have effects such as relaxation of myofascial tension, promotion of lymph circulation, pain relief, and stabilization of the autonomic nervous system (Choi, 2007). In previous studies, myofascial release manual therapy was used to release metabolites, increase blood flow (Park, 2012), reduce body fat and subcutaneous fat, activate parasympathetic nerves, and reduce stress (Ryu, 2018).

The cases of applying myofascial release manual therapy to lumbago include Kim (2012) that confirmed significant effect on pain relief and hip flexion by applying myofascial release therapy to the iliopsoas muscle and Lee (2019) reported that combination of manual therapy and aromatherapy is effective in pain relief. The combination of exercise and myofascial release therapy had a positive effect on improving the flexibility of the lumbar region (Choi, 2020), and myofascial release therapy had a significant effect on joint mobility in patients with chronic lumbago (Lee, 2018). Domestic studies related to these positive effects of myofascial release manual therapy on low back pain were limited. In addition, most of the studies on lumbago deal with exercise therapy, and many of the studies on manual therapy are also designed to be combined with exercise therapy, so it is difficult to interpret the results as the effect of myofascial release manual therapy alone. Jang & Kim (2006) compared manual therapy and epidural injection therapy in lumbago patients and reported fewer side effects and higher satisfaction with manual therapy, showing that manual therapy is a treatment regimen that can be applied equally to injection therapy. Koes et al. (1992) applied manual physical therapy, non-manual physical therapy, and clinician's treatment to three groups of patients complaining of back pain and reported that the effect was the greatest in the manual therapy group. Therefore, it is very reasonable to apply manual therapy to those who have experienced lumbago, and it is considered to be a meaningful study to expand the scope of conservative treatment due to lumbago to understand the effect of only manual therapy on lumbago.

2. Methodology

Subjects

The conditions for inclusion of subjects were middle-aged women who reported a score of three or higher on the intensity of back pain on the Visual Analogue Scale (VAS), not currently being treated for a chronic disease, not receiving any other manual therapy or surgical procedure during the study period, voluntary consent to participate in the study. A total of 26 patients were selected and randomly assigned to an experimental group receiving manual therapy (n=13) and a control group receiving hyperthermia (n=13). After excluding subjects who failed to faithfully participate in the study (n=3) and dropped (n=2) from control group, data from 21 subjects (experimental group, n=13; control group, n = 8) were analyzed.

Procedure

The subjects of this study were 26 middle-aged women who had experienced lumbago. 13 subjects in the experimental group received myofascial release manual therapy focusing on the lower body, and another 13 subjects in the control group received thermal management using a heating dome. Each session lasted 30 minutes and was conducted twice a week for a total of eight sessions. For the analysis of the effect of manual therapy, intensity of lumbago (VAS), Oswestry Disability Index (ODI), and hip joint range of motion were measured before and after the treatment. The experiment site was a professional esthetic where temperature of 20-24°C and humidity of 40-60% were maintained.

Manual therapy for Experimental Group

Table 1 shows the specific procedure of the myofascial release manual therapy applied in this study.

Table 1: Procedure and Method of Myofascial Release Manual Therapy

Order	Method
1	The subject takes a supine position, and the practitioner gently sweeps the subject's relaxation points from the right side.
2	The practitioner shakes the subject's coccyx with the wrist to open it.

3	The practitioner gently presses the subject's sacrum and iliac crest and sweeps them down along the pelvic line to relax them.
4	The practitioner gently presses and shakes the subject's right flank line to relax it.
5	After folding the subject's legs upright, the practitioner twists and stretches the inner thigh line and adductor muscles.
6	After folding the subject's legs upright, the practitioner twists and stretches the inner thigh line and adductor muscles.
7	The practitioner massages the subject's gluteus maximus and medius using the entire palm.
8	The practitioner folds the right leg of the subject, presses the bent leg with the left hand, and pushes the erector muscle with the right hand, relaxing the erector spinae muscle and the quadratus lumbosacral muscle.
9	The practitioner massages in a clockwise direction the abdomen of the subject in a supine position to relax it.
10	The practitioner places one hand on the subject's chest and the other hand below the ribs and pushes them downward while letting the subject breathe to lower the ribs.
11	The practitioner folds the subject's leg and places it on its side, then twists the inner thigh line and adductor muscles to stretch them.
12	The practitioner presses the pubic bone of the subject with the palm to relaxe the groin.
13	The practitioner folds the subject's leg and pushes it up to stretch it, and puts his/her arm between the subject's thigh and calf and presses it gently to stretch the pelvis.
14	The practitioner straightens the subject's legs and stretches the pelvis by lightly gripping and tapping the gluteus medius and gluteus maximus with a fist.
15	The practitioner fixes the subject's leg by pinching it around his/her side, and repeats the pulling and pushing motion three times.
16	The practitioner stands under the subject's feet and sweeps and relaxes the entire leg.

Measurement

1 Vas

Vas is a Scale used to measure the current subjective pain level felt by the subject. Ryu (2015) and Kim (2016) were referenced. The six horizontally arranged cells represent, from the left, no pain (0), mild pain (1-2), moderate pain (3-4), and extreme pain (5).

ODI

ODI was translated into Korean and it was used to measure the degree of functional disability caused by lumbago. Nine sub-factors of ODI include walking status, lifting ability, standing, sitting, personal hygiene level, pain level, pain level during sleep, pain during travel and social life, and sex life. Each question consisted of 6 items answered using a 6-point ordinal scale, and the sum of the scores was divided by 45 and multiplied by 100 to obtain a percentage, which was used as an index. 0-20% mild, 21-40% moderate, 41-60% severe, over 60% lifelong impairment, and 80-100% bedridden conditions (Brokelman, Haverkamp, van Loon , Hol, van Kampen & Veth, 2012).

Measurement of Joint Range of Motion

A digital goniometer (Baseline® absolute axis goniometers 12-1027. Preston, USA) was used to measure changes in hip joint range of motion due to back pain. The average range of the extended state is 0-30^{o} (Eom & Park, 2010). The axis of motion is the coronal plane, and the plane is the sagittal plane. The subject assumes a prone position with both legs fully extended. While not lifting the pelvis from the bed, extend the hip joint until there is resistance from the subject or until rotation of the pelvis occurs. The average range for hip flexion is 0-90^{o}. The plane of motion is the sagittal plane. The subject is measured in the supine position, stabilizing the thoracic spine, shoulder blades, and pelvis, and keeping the leg on the opposite side of the measurement fully extended. Measurements were performed while flexing the subject's knee extension until there was a limit or pelvic rotation. The axis of motion of hip abduction is the sagittal plane, and the plane is the coronal plane. The average range of hip flexion ranged from 0-45^{o}. The measurement was performed after abduction was performed with the subject in the supine position and abduction was performed with the leg fully extended until resistance appeared or flexion of the lateral trunk occurred.

Statistical Analysis

Collected data processing goes through data coding and data cleaning processes, and SPSS v. 21.0 program was used for statistical analysis. An independent sample t-test was conducted to verify the pre-homogeneity of low back pain and range of motion between groups. Changes in low back pain and joint range of motion were compared between the experimental group and the control group using a paired-sample t-test.

3. Results and discussion

Pre-Homogeneity of Lumbago between Groups

There were no statistically significant differences in VAS and ODI between the experimental and control groups, confirming prior homogeneity between groups (Table 2).

Table 2: Test of pre-homogeneity of lumbago between groups

Division	Group	N	M	SD	t-value	p
VAS	Experimental group	13	4.08	.641	1.681	.109
	Control group	8	3.63	.581		
ODI (%)	Experimental group	13	18.15	1.068	1.508	.148
	Control group	8	17.50	.756		

Pre-Homogeneity of Hip Range of Motion Between Groups

There were no statistically significant differences in VAS and ODI between the experimental and control groups in flexion, extension, and abduction, confirming prior homogeneity between groups (Table 3).

Table 3: Test of pre-homogeneity of hip range of motion between groups

Division	Group	N	M	SD	t-value	p
Flexion	Experimental group	13	78.77	2.682	-1.282	.215
	Control group	8	80.13	1.642		
extension	Experimental group	13	20.62	1.325	-2.072	.052
	Control group	8	22.25	2.315		
abduction	Experimental group	13	32.15	1.994	-.512	.614
	Control group	8	32.63	2.134		

Test of Effect on Intensity of Lumbago

Analysis of difference in changes in lumbago intensity between the experimental group and the control group (Table 4) showed a statistically significant change in the experimental group (pre: 4.08, post: 1.85; t=8.678, p<.001) and no statistically significant change in the control group (pre: 3.63, post: 3.38; t=8.678, p>.05) though it decreased.

The pain rating scale used in this study is an indicator of subjective pain. The analysis results showed a significant effect on the reduction of lumbago in middle-aged women in the experimental group. Myofascial release manual therapy, the main treatment in this study, was directly applied to the muscles of the lower extremities related to the lumbago, and it is thought that this had a positive effect on the lumbago control, supporting the result of Lee (2109) that application of myofascial release therapy relieved pain in working women

Table 4: Test of effect on intensity of lumbago

Division	Group	N	Pre		Post		t-value	p
			M	SD	M	SD		
VAS	Experimental group	13	4.08	.641	1.85	.081	8.678***	.000
	Control group	8	3.63	.518	3.38	.518	1.528	.170

***p<.001

Test of Effect on ODI

Analysis of difference in changes in ODI between the experimental group and the control group (Table 5) showed a statistically significant change in the experimental group (pre: 18.15%, post: 11.62%; t=9.815, p<.001) and no statistically significant change in the control group (pre: 17.50%, post: 17.13%; t=2.049, p>.05) though it decreased.

ODI indicates the degree of functional impairment of the body due to lumbago. The result of this study showing a statistically significant decrease in the low back pain disability index of the experimental group to which myofascial release manual therapy was applied is consistent with the result of Hong (2016) that application of massage therapy reduced functional disability due to lumbago and of Kim (2018) that application of manual traction therapy reduced lumbago disability. Most of the previous studies that reported the reduction effect of ODI applied exercise therapy as the main mediator (Oh, 2018; Kim, 2018; Bae, 2017), and only a few of them applied manual therapy. Therefore, the results of this study contributed to this field in that they showed the effective efficacy and positive potential of manual therapy, and are expected to be used as basic data in various manual therapy studies for relieving lumbago in the future.

Table 5: Test of effect on ODI

Division	**Group**	**N**	**Pre**		**Post**		**t-value**	**p**
			M	SD	M	SD		
ODI	Experimental group	13	18.15	1.068	11.62	2.256	9.815***	.000
	Control group	8	17.50	.756	17.13	.835	2.049	.080

***p<.001

Test of Effect on Hip Range of Motion

Test of Effect on Hip Flexion.

Analysis of difference in changes in hip flexion between the experimental group and the control group (Table 6) showed a statistically significant change in the experimental group (pre: 78.77º, post: 85.85º; t=15.895, p<.001) and no statistically significant change in the control group (pre: 80.13º %, post: 81.00º; t=1.986, p>.05) though it increased, supporting efficacy of myofascial release manual therapy on hip flexion.

Table 6: Test of effect on hip flexion

Division	**Group**	**N**	**Pre**		**Post**		**t-value**	**p**
			M	SD	M	SD		
Flexion (º)	Experimental group	13	78.77	2.682	85.85	1.573	-15.895***	.000
	Control group	8	80.13	1.642	81.00	1.852	-1.986	.087

***p<.001

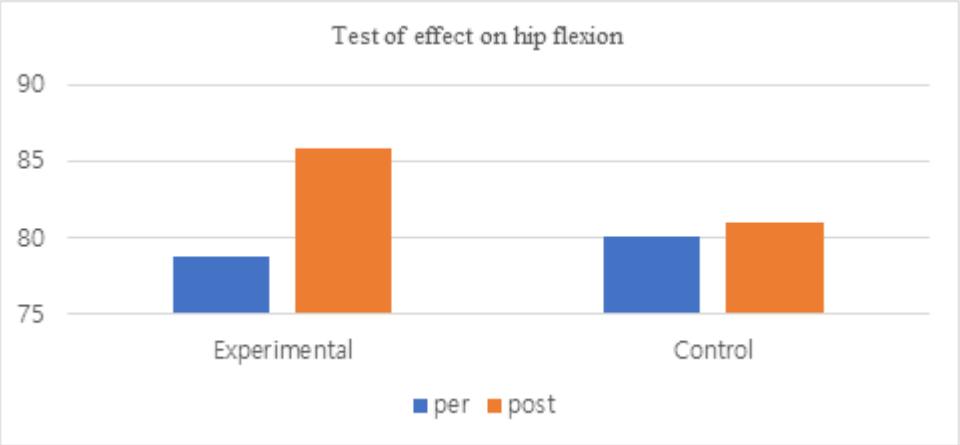

Fig. 1: Test of effect on hip flexion

Test of Effect on Hip Extension

Analysis of difference in changes in hip extension between the experimental group and the control group (Table 7) showed a statistically significant change in the experimental group (pre: 20.62º, post: 26.77º; t=-11.628, p<.001) and no statistically significant change in the control group (pre: 22.25º %, post: 22.63º; t=1.986, p>.05) though it increased, supporting efficacy of myofascial release manual therapy on hip extension.

Table 7: Test of effect on hip extension

Division	Group	N	Pre		Post		t-value	p
			M	SD	M	SD		
Extension (º)	Experimental group	13	20.62	1.325	26.77	1.166	-11.628***	.000
	Control group	8	22.25	2.315	22.63	2.446	-2.049	.080

***p<.001

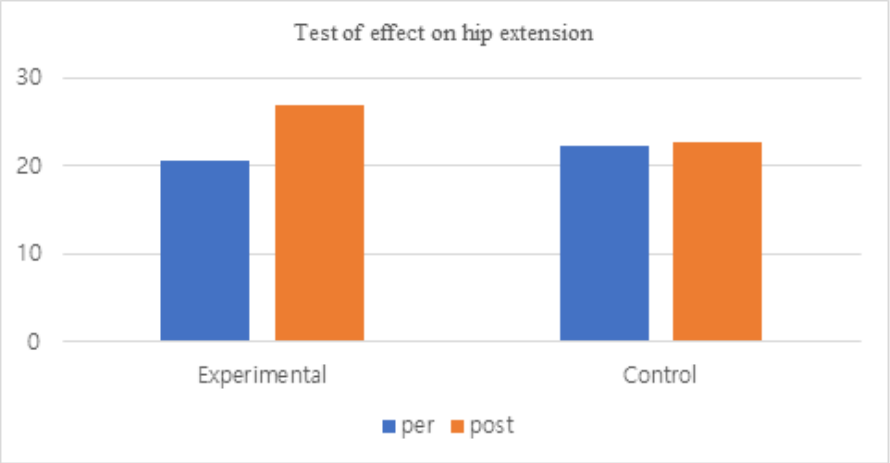

Fig. 2: Test of effect on hip extension

Test of Effect on Hip Abduction

Analysis of difference in changes in hip abduction between the experimental group and the control group (Table 8) showed a statistically significant change in the experimental group (pre: 32.15º, post: 41.15º; t=-13.632, p<.001) and no statistically significant change in the control group (pre: 32.63º %, post: 33.00º; t=1.158, p>.05) though it increased, supporting efficacy of myofascial release manual therapy on hip abduction.

Table 8: Test of effect on hip abduction

Division	Group	N	Pre		Post		t-value	p
			M	SD	M	SD		
Abduction (º)	Experimental group	13	32.15	1.994	41.15	2.824	-13.632***	.000
	Control group	8	32.63	2.134	33.00	2.268	-1.158	.285

***p<.001

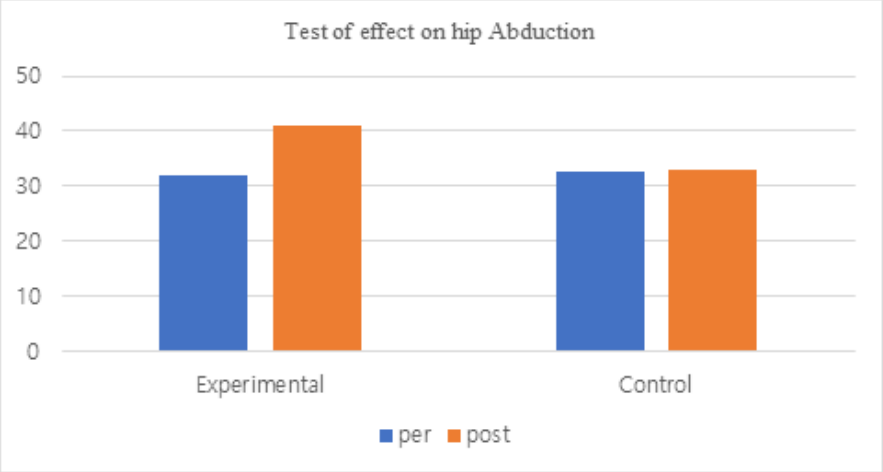

Fig. 3: Test of effect on hip abduction

Changes in hip range of motion measured in this study showed that the effects on flexion, extension, and abduction were significantly stronger in the experimental group than in the control group. Long-term sustained muscle tension due to pain makes it difficult to control relaxation and contraction and limits the range of motion of the joint (Kang, 2009). A tension state in the latissimus dorsi, quadratus lumborum, longis longus, and multifidus, which are the posterior lumbar muscles, restricts hip flexion movements, and a tension state in the anterior lumbar muscles, the internal oblique, external oblique, transversus abdominis, pyramidal, and iliopsoas, restricts hip extension.(Hong, 2016). In addition, the tension state in the iliopsoas muscle, gluteus minimus muscle, gluteus maximus muscle, tensor fascia latissimus majorus muscle, and bongon muscle is related to abduction of the hip joint. Baek (2019) analyzed the effect of mechanical stimulation that gives moderate vibration to the whole body on hip joint movement and reported that stimulation that does not strain the body improved muscle function, in consistent with the result of this study that myofascial release manual therapy restored muscle tension.

4. Conclusion and future scope

The purpose of this study was, to investigate the effect of myofascial release manual therapy on lumbago release and hip range of motion in middle-aged women who experienced lumbago. For the purpose, the subjects were randomly assigned to an experimental group to which myofascial release manual therapy was applied and a control group to which thermal therapy was applied, and a total of 8 sessions were conducted twice a week. The results showed more statistically significant positive changes in lumbago release, hip flexion, extension, and abduction in experimental group compared to control group. This suggests that myofascial release manual therapy is a complementary and alternative therapy that can be usefully applied to middle-aged women suffering from lumbago.

Most of the subjects in this study experienced lumbago for less than 1 year. Inclusion of middle-aged women who have experienced lumbago for a longer period of time is recommended for future studies. In addition, studies on lumbago relief through manual therapy applied to lumbago in middle-aged men and methodically different manual therapy are recommended.

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