

The effects of motion taping on young males' lumbar stabilization exercise

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| Abstract |

PURPOSE: This study was conducted to examine the effects of motion taping on the effects of lumbar stabilization exercise.

METHODS: The subjects of this study were 24 normal males with no problem in their nervous systems or musculoskeletal systems. The subjects were randomly assigned to a control group of 12 subjects and an experimental group of 12 subjects. The control group was applied with lumbar stabilization exercise while the experimental group was applied with lumbar stabilization exercise after being attached with tapes. The intervention period was four weeks in total and the subject underwent the exercises three times per week. The exercise time per session was set to one hour in principle consisting of warm-up exercise and cool-down exercise for 10 minutes each and main exercise for 40 minutes. Lumbar muscle strength was measured as a factor to examine the effects of lumbar stabilization exercises.

RESULTS: The control group showed an increase in lumbar muscle strength from 111 ± 6.30 kg to 113 ± 6.23 kg and

the experimental group showed an increase in lumbar muscle strength from 108 ± 6.46 kg to 116 ± 5.21 kg. The increases shown by both groups were statistically significant and the experimental group that was applied with motion taping showed a larger increase in lumbar muscle strength compared to the control group.

CONCLUSION: Lumbar stabilization exercise is considered to be good for lumbar stability and muscle strengthening and lumbar stabilization exercise applied with motion taping is considered to show larger effects for muscle strengthening and the improvement of lumbar functions.

Key Words: Motion taping, Lumbar stabilization, muscle strength

I. Introduction

The lumbar region is very important as a central region of human bodies that makes forces for postures and movements. As sedentary life has been increasing and physical activities have been decreasing due to modernization, injuries in the lumbar region have been increasing due to declines in physical strength and other causes (Kim et al, 2007). As a result, the number of those who are suffering from low back pain has been increasing (Lee, 2002). Those who have problems in their lumbar region are characterized by weakened lumbar muscle

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functions along with pain because the extensibility of their lumbar muscles is much lower compared to normal persons (Park, 2004). Because of the importance of lumbar region as such, lumbar exercise is applied to many people in diverse methods. Recently, lumbar stabilization exercise has been greatly spotlighted as a method for low back pain patients and for the health of the lumbar region (Handa et al, 2000). tabilization is the ability to control fine movements of joints unconsciously or consciously. Along with training of muscles that cannot be used well at normal times, lumbar stabilization exercise is characterized by well using intrinsic trunk muscles that can lead fine movements (Magee, 1999).

Lumbar stabilization exercise is an exercise method that increases the activity of the lumbar segmental muscles and activates large trunk muscles and intrinsic muscles that are not frequently used at normal times so that the exercise is adjusted for harmonious mobilization of muscles thereby inducing increases in lumbar muscle strength and helping the lumbar muscles play many roles in diverse movements and postural control in daily living (Delisa, 1988). In particular, since maintaining appropriate strength and endurance of trunk muscles is very important, lumbar stabilization exercise is frequently used for muscle strength improvement and postural control. The weakening of such lumbar muscles acts as a cause of the outbreak of acute or chronic low back pain. Low back pain patients show imbalance between the flexor and the extensor along with lumbar muscle weakening and exercise treatment is necessary for these patients (David and Brian, 1999). In the case of patients with chronic low back pain, among many solutions, lumbar extensor strengthening is necessary for improvement of functional movements and normal daily living along with pain relief (Jee et al, 2003).

Elastic therapeutic taping can be used for muscle strength improvement and correct postures. When kinesio taping was applied to a low back pain patients' lumbar extension exercise program, extensor muscle strength increased and

pain decreased (Nam and Cho, 2010). Motion taping is a method of application of elastic therapeutic taping that activates the movements of human body parts with limited ranges of motion and helps their movements. This method generally uses elastic tapes that extend similarly to muscles and is applied through the evaluation of pain and the range of joint motion (Jang et al, 2011).

Elastic therapeutic taping is used by expert athletes to improve motor skills and prevent sport injuries, easily applicable to daily living without any inconvenience, and frequently used in treatment of general people's acute and chronic musculoskeletal system diseases (Kim, 2006). It is diversely applied because it is known to normalize the functions of muscles and joints using the principle of homeostasis of muscles, help the circulation of blood, lymph fluid, and tissue fluid to reduce pain and improve functions (Ko, 2002).

In this respect, this study was conducted to examine the positive effects of the application of elastic therapeutic taping to lumbar stabilization exercise that shows functional improvement and muscle strengthening of the lumbar region on the muscle strengthening effects of lumbar stabilization exercise. This study was conducted based on the assumption that if the magnitudes of lumbar muscle strength are measured to examine the effects of lumbar stabilization exercise and the magnitudes of changes in muscle strength according to whether elastic therapeutic taping is applied or not are measured, more effective methods of application of lumbar stabilization exercise can be provided

II. Method

1. Subjects

The subjects that participated in this study were 24 males in their 20s with no pain in the lumbar region or damage to the musculoskeletal system or the nervous system. The

Table 1. Lumbar stabilization program

Type of exercise	time	frequency	set
Warming up	10 min		
- Sit up		10	3
- 15kg weight Sit up		10	3
Main-exercise			
- Sit up(tilt 45)		10	3
- 15kg weight Sit up(tilt 45)	40 min	10	3
- Dead lift		30	3
- Pelvic tilting		60sec	3
Cool down	10 min		

subjects were included to those who had no disease or damage in the shoulder and back region and had no pain during daily living, congenital deformity or disease, surgical damage, or neurological damage or disease. The subjects were selected only from among those who voluntarily agreed to participate in the experiment after the purpose and method of this study were explained.

2. Study tool and method

1) Experimental tool

CNP-5402 (Takei, Japan) was used to measure lumbar muscle strength. For the measurement, feet were fixed in the position shown in the footsteps of the machine. In attention it was attached to maintaining a posture palms on the front thigh. Adjust the height of the handlebars and back strength was based on the fingertips touching. The subjects were instructed to completely extend both knees, keep the head and trunk upright without leaning backward, grip the handle so that the handle was located above the hands, and pull the handle using only their lumbar muscles. It was measured twice, the mean of values was used.

2) Study method

The lumbar stabilization program was implemented using a program used in a previous study. The program consisted of six types of exercise and was implemented for one hour per session (Choi et al, 2009). Warm up exercise was implemented first for 10 minutes followed

by main exercise for 40 minutes and cool down exercise for 10 minutes in order of precedence. Warm up and cool down exercise were stretching (Table 1). Sit up exercise steps were following. 1)Lying on the floor with knees bent and feet contact on the floor. 2)Lift the head slightly while the strength in the abdomen. 3)Lift the upper body while round the back. 4)Return the position with strained abdomen. The exercise was implemented three times per week for four weeks in total. The control group implemented only the lumbar stabilization program. Each subject in the experimental group was applied with a motion tape on the erector spinae muscle before implementing the lumbar stabilization program. The tape was attached before exercise and removed after exercise in principle. The tape was cut in the middle and attached in the shape of letter Y from the sacrum to shoulder blade T6-7. When the tape was attached, the subject bent the trunk maximally and the tape was attached along the erector spinae muscle on the two sides of the spinous process.

3. Analysis method

In this study, the statistical program SPSS 12.0 for Windows was used to compare and analyze the measured data. The analyses of covariance was used to compare muscle strength differences between groups, and t-tests were used to compare the data before and after the experiment in each group. Because differences of pre value between control and experimental group, ANCOVA was used. The significance level was set to $\alpha=0.05$.

Table 2. Paired t-test on each group

	pre	post	t	p
Control group	111.06±6.30	113.02±6.23	-2.78	0.01*
Experimental group	108.64±6.46	116.12±5.21	-7.22	0.00*

*p<.05

Table 3. ANCOVA of muscle strength differences between groups

group	Control group	Experimental group	F	p
group	113.02±6.23	116.12±5.21	18.29	0.00*

*p<.05

III. Results

The control group's mean age, height, and weight were shown to be 22.9±1.2 years, 173.4±4.4cm, and 77.3±7.1kg respectively and the experimental group's mean age, height, and weight were shown to be 22.4±1.7 years, 172.9±4.4cm, and 79.7±4.2kg respectively.

As for changes in lumbar muscle strength, the both control and experimental group showed an increase after the intervention. The differences between before and after the intervention shown by both groups were statistically significant (Table 2). In comparison between intervention methods, the experimental group applied with motion taping showed a larger increase in lumbar muscle strength (Table 3).

IV. Discussion

Lumbar stabilization exercise is applied to diverse people. In particular, when it was applied to low back pain patients, the range of motion of the patients increased and the functions of the patients were recovered (Jung and Bae, 2004). In addition, when it was applied to healthy adults in their 20s (Kong, 2005), the subjects' balance ability was improved and when it was applied to athletes, good results were shown. When it was applied to sireum wrestlers

that extensively require the strength of the extensor in the lumbar region, it increased the muscle strength and changed the muscle activity thereby increasing the activity of the trunk stabilizer (Choi et al, 2009).

As such, if the muscles around the lumbar spine are strengthened through lumbar stabilization exercise (McGill, 2007), the functional stability of the body will be enhanced and other positive effects can be obtained such as muscle strengthening, balance ability improvement, and postural corrections (Brill and Couzens, 2008).

In this study, changes in muscle strength while lumbar stabilization exercise was implemented when motion taping was applied and when motion taping was not applied were measured. The control group that implemented only lumbar stabilization exercise showed an increase in lumbar muscle strength after the intervention and the experimental group that was applied with motion taping during lumbar stabilization exercise showed a larger increase in lumbar muscle strength after the intervention (p<0.05). The increases of lumbar muscle strength in both groups were statistically significant and the experimental group showed a larger increase in muscle strength compared to the control group. The reason why muscle strength is improved with lumbar stabilization exercise is that lumbar stabilization exercise mobilizes more muscles and increases the activity of the muscles. As shown in previous studies too, based on the results of measurement of muscle activity during lumbar

stabilization exercise, the activity of the transverse muscle of abdomen in the trunk as well as the erector spinae muscle was enhanced so that the muscle strength was improved (Vezina and Hubley, 2000). In this study, the application of motion taping improved muscle strength further during lumbar stabilization exercise. This result is consistent with the results of previous studies indicating that motion taping increased muscle strength and muscle endurance. When elastic therapeutic taping was applied to the lumbar region of chronic low back pain patients, lumbar extensor muscle strength improved significantly (Kim, 2005). And when elastic therapeutic taping was applied to the femoral region, knee joint muscle strength and endurance significantly increased (Lee, 2009). In this study, when motion taping was applied, lumbar muscle strength increased further. Therefore, motion taping can be said to be an appropriate method for enhancing the effects of exercise further when lumbar stabilization exercise that can increase lumbar muscle strength is applied.

V. Conclusion

In this study, the effects of motion taping on the improvement of muscle strength by lumbar stabilization exercise were examined through intervention for four weeks in a group that was applied with motion taping during lumbar stabilization exercise and a group that was not applied with motion taping. Since the group that was applied with motion taping showed statistically significant larger increases in muscle strength than the group that was not applied with motion taping, the application of motion taping can be suggested as a method for increasing the effects of lumbar stabilization exercise. Lumbar stabilization exercise is a therapeutic exercise method used on diverse people. It can be applied as a more effective exercise method if motion taping is used as shown by the results of this study.

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