The Effect of Kinesio-Taping on the Change of Muscle Strength and Endurance in Trunk Flexion and Extension in Chronic Low Back Pain (CLBP)

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Summary: Ⅰ-shaped and Y-shaped sacrospinalis muscle taping was applied to patients with chronic lumbago to determine numerically the changes in muscle strength and gravity at the time of flexion and extension of the trunk.
Emphasis of Presentation: In this study, the Ⅰ-shaped taping and the Y-shaped taping were compared
Clinical research report or Basic research report:
Modern people not only have mental stresses but also physical fatigue and stress due to repetition of a series of postures and lack of exercise in daily life. One of the chronic diseases occurring in such conditions is lumbago. On male and female subjects with chronic lumbago, the muscle strength and gravity were determined, before application of the Kinesio Tape, at the time of flexion and extension of the trunk using Bio-Dex. Thereafter, the Y-shaped Taping was applied to the sacrospinalis muscle, and the same testing was conducted to compare the results before and after taping.
In addition, the Ⅰ-shaped Tape was applied to the sacrospinalis muscle on both sides, centering on the lumbar vertebra. Then the same testing was conducted to compare the results before and after Kinesio Taping. We determined which taping technique is most effective for patients with chronic lumbago. This study was conducted on patients with chronic lumbago in the range not inducing pain.

Ⅰ **Purpose of study**

This research has been conducted on the application of Kinesio Tape on patients who had chronic low back pain. The range of motion in flexion and extension of the lower back, and the difference in their condition before and after the Kinesio Taping has been tested through Biodex. The purpose of the research was to observe the process of change in muscle endurance and strength of flexion and extension, and to assess the improvement of muscle strength and endurance as well.

Ⅱ **Hypothesis of study**

1) The muscle strength will be improved more with application of Kinesio Tape than without application of Kinesio Tape.
2) Endurance will be improved more with application of taping than without application of taping.
3) Muscle strength and endurance results will differ between of Y-shaped taping and Ⅰ-shaped taping.

Table 1 - Subjects

Group	Gender(NS.)	Age(yrs.)
	Male(10)	30.4±5.6
	Female(10)	34.2±13.4

Ⅲ **Data**

All figures determined were expressed as a mean value and take into consideration the standard deviation (S.E.). The statistical significance for isokinetic muscle strength and endurance of the hip at the time of examination were tested by paired t-test using SPSS of 10.0 before application of taping and after application of Y-shaped and Ⅰ-shaped taping, and verified at the level of significance of $p<0.05$.

Ⅳ Apparatus and method of determination

1) Apparatus

The measuring apparatus used for determination of muscle strength and muscle endurance at bending and extension of the lumbar spine in patients with chronic lumbago are shown below.

Table 2 Measuring apparatus

Test factor	Equipment	Company
Lumbar flexion strength	Back Attachment	Biodex medical systems, Inc U.S.A
Lumbar flexion endurance		
Lumbar extension strength	Back Attachment	
Lumbar extension endurance		

図 1

図 2

2) Method of determination

In order to determine the muscle strength and endurance in the hip before and after use of Kinesio Taping and to determine the maximum muscle strength and endurance of the flexor and extensor muscles in the hip, the patient sat on a measuring chair and was examined by fixing the lower limbs with the knee support, femoral support and pelvic support so that the muscles in the lower limbs would not move (Figure 2).

The patients with chronic lumbago were examined using Biodex, the range not showing any pain, that is, the patient was examined by setting the whole range of examination at 70°. When the muscle strength and endurance were examined, the patient was seated on a measuring chair at 90°, and movement from bending to extension was examined. Y-shaped and I-shaped Kinesio Tapes were used. They were used in 30 cm lengths, according to the patient's build (Figures 3 and 4).
The examination was conducted before and after Y-shaped taping and I-shaped taping in this order.

図 3

図 4

The patient with chronic lumbago was examined, before taping, using Biodex, and the muscle strength at flexion and extension of the lumbar spine was determined at an angle of 60°. After resting for 20 seconds, the angle was set at 90°, and the muscle endurance of flexion and extension of the lumbar spine was determined.

Y-shaped taping, a sacrospinalis taping, was applied to a patient. Using Biodex, the muscle strength at flexion and extension of lumbar spine at an angle of 60° was established. After resting for 20 seconds, the angle was set at 90°, and the muscle endurance of flexion and extension of lumbar spine was again determined.

I-shaped taping was applied to the bilateral erector spinae muscle of the patient. Using Biodex, the muscle strength at flexion and extension of lumbar spine at an angle of 60° was established. After resting for 20 seconds, the angle was set at 90°, and the muscle endurance of flexion and extension of lumbar spine was again determined.

V Study results

1. The comparison of *muscle strength* of the hip before application of Kinesio Taping and after application of Y-shaped taping are as follows:
   After application of Y-shaped taping, the muscle strength at extension of the hip at loading of 60°/sec showed the level of significance ($p<0.05$). Before application of Kinesio Taping and after application of Y-shaped taping, however, the muscle strength at flexion of the hip at loading of 60°/sec has not shown the level of significance.

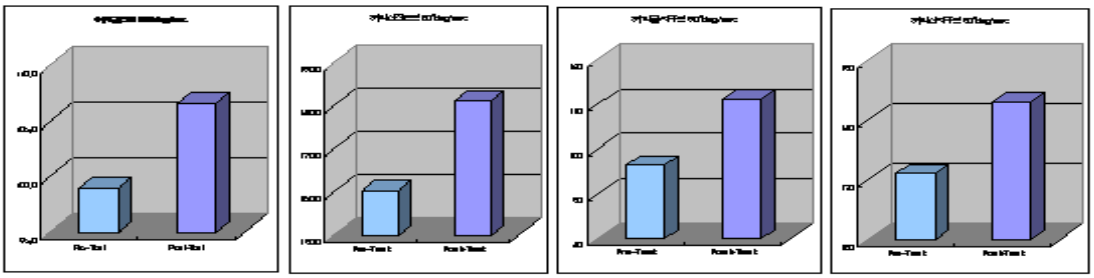
2. The comparison of *muscle endurance* of the hip before application of Kinesio Taping and after application of Y-shaped taping are as follows:
   After application of Y-shaped taping, the endurance of the flexor muscle and the extensor muscle of the hip has not shown the level of significance at loading of 90°/sec.

Table 3. Results before and after application of Y-shaped Kinesio Taping

	Mean	S.D	Std. Error Mean	Sig. (2-tailed)
60°deg/sec flexion strength	-7.5900	17.9024	4.0031	.073
60°deg/sec extension strength	-20.5350	28.2419	6.3151	.004
90°deg/sec flexion endurance	-14.8250	39.5930	8.8533	.110
90°deg/sec extension endurance	-12.0100	43.9821	9.8347	.237

Table 4. Comparison of muscle strength and endurance of the hip before application of Kinesio Taping and after application of Y-shaped taping

Time	Lumbar flexion strength	Time	Lumbar extension strength	Time	Lumbar flexion endurance	Time	Lumbar extension endurance
	60°deg/sec		60°deg/sec		90°deg/sec		90°deg/sec
Pre-Test	99.0	Pre-Test	160.4	Pre-Test	96	Pre-Test	171
Post-Test	106.6	Post-Test	181.0	Post-Test	111	Post-Test	183



3. The comparison *of muscle strength* of the hip before application of Kinesio Taping and after application of I-shaped taping are as follows:
After application of I-shaped taping, the extensor muscle strength of the hip at loading of 60°/sec showed the level of significance ($p<0.05$). After application of I-shaped taping, the flexor muscle strength of the hip at loading of 60°/sec showed the level of significance ($p<0.05$).

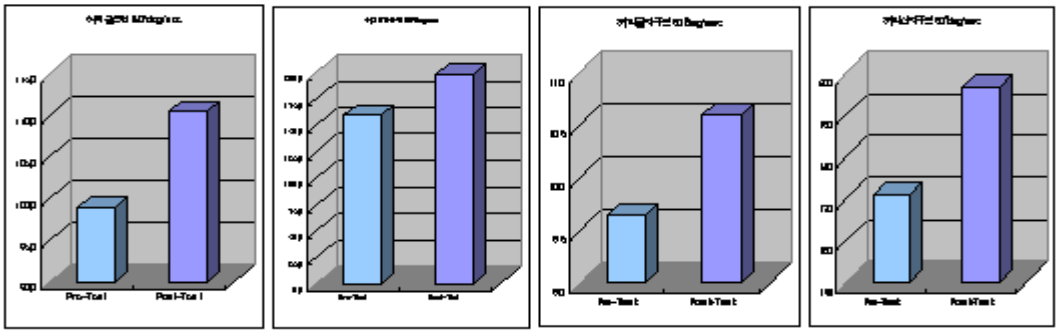
4. The comparison of *muscle endurance* of the hip before application of Kinesio Taping and after application of I-shaped taping are as follows:
After application of I-shaped taping, the flexor muscle endurance of the hip at loading of 90°/sec has not shown the level of significance. After application of I-shaped taping, the extensor muscle endurance of the hip at loading of 90°/sec showed the level of significance ($p<0.05$).

Table 5. Results before and after application of I-shaped Kinesio Taping

	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
60°deg/sec flexion strength	-11.3850	22.9049	5.1217	.039
60°deg/sec extension strength	-38.0600	38.2449	8.5518	.000
90°deg/sec flexion endurance	-9.5850	30.7482	6.8755	.179
90◦deg/secextension endurance	-25.8050	44.3498	9.9169	.018

Table 6. Comparison of muscle strength and endurance of the hip before application of Kinesio Taping and after application of I-shaped taping

Time	Lumbar flexion strength	Time	Lumbar extension strength	Time	Lumbar flexion endurance	Time	Lumbar extension endurance
	60°deg/sec		60°deg/sec		90°deg/sec		90°deg/sec
Pre-Test	99.0	Pre-Test	160.4	Pre-Test	96	Pre-Test	171
Post-Test	110.4	Post-Test	198.5	Post-Test	106	Post-Test	197



5. The changes in muscle *strength* of the hip after application of Y-shaped taping and I-shaped taping are as follows:
In a comparison of the results of Y-shaped taping and I-shaped taping, the flexor muscle strength of the hip at loading of 60°/sec has not shown a significant difference, but the extensor muscle strength of the hip showed the level of significance ($p<0.05$).

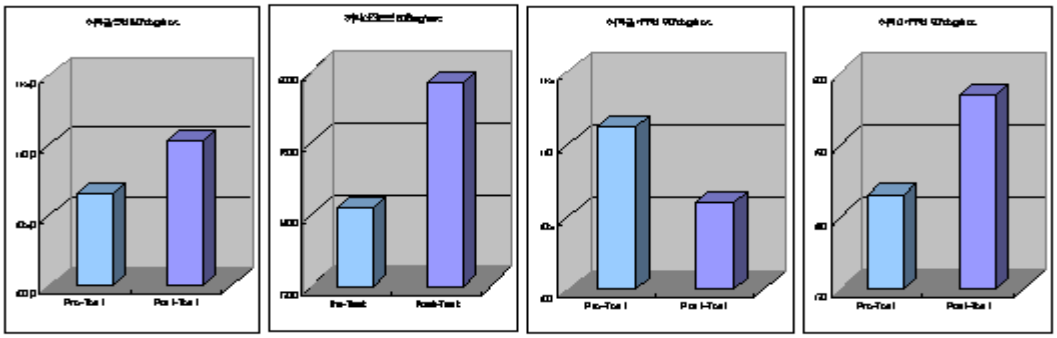
6. The changes in muscle *endurance* of the hip after application of Y-shaped taping and I-shaped taping are as follows:
In a comparison of the results of Y-shaped taping and I-shaped taping, the flexor muscle and the extensor muscle endurance of the hip at loading of 90°/sec has not shown a significant difference.

Table 7. Changes before application of Y-shaped taping and I-shaped taping

	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
60°deg/sec flexion strength	-3.7950	12.9785	2.9021	.207
60°deg/sec extension strength	-17.5250	26.7400	5.9792	.009
90°deg/sec flexion endurance	5.2400	40.7011	9.1010	.572
90°deg/sec estension endurance	-13.7950	46.7848	10.4614	.203

Table 8. Changes before application of Y-shaped taping and I-shaped taping

Time	Lumbar flexion strength	Time	Lumbar extension strength	Time	Lumbar flexion endurance	Time	Lumbar extension endurance
	60°deg/sec		60°deg/sec		90°deg/sec		90°deg/sec
Pre-Test	106.6	Pre-Test	181.0	Pre-Test	111	Pre-Test	183
Post-Test	110.4	Post-Test	198.5	Post-Test	106	Post-Test	197



VI Conclusion and discussion

In this study, the muscle strength and endurance of the hip at flexion and extension were determined using an isokinetic muscle strength meter (Biodex) in patients with chronic lumbago (10 males and 10 females), and the changes in muscle strength and endurance of the hip at flexion and extension after application of Y-shaped sacrospinalis muscle taping, typically used for patient with lumbago, were studied. In addition, the sacrospinalis muscle taping of a different shape (I-shaped taping) was applied bilaterally centering on the spine, and the muscle strength and endurance of the hip at flexion and extension were determined and compared with those before taping. In addition, the results after application of Y-shaped taping and I-shaped taping were also compared.

The conclusions are as follows:

1. The extensor muscle strength of the hip at loading of 60°/sec before and after application of Y-shaped Kinesio Tape showed the level of significance ($p<0.05$). The flexor muscle strength of the hip at loading of 60°/sec before and after application of Y-shaped Kinesio Tape did not show the level of significance.

2. The flexor muscle endurance of the hip at loading of 90°/sec before and after application of Y-shaped Kinesio Tape did not show the level of significance. The extensor muscle endurance of the hip at loading of 90°/sec before and after application of Y-shaped Kinesio Tape did not show the level of significance.

3. The extensor muscle strength of the hip at loading of 60°/sec before and after application of I-shaped Kinesio Tape showed the level of significance ($p<0.05$). The flexor muscle strength of the hip at loading of 60°/sec before after application of I-shaped Kinesio Tape showed the level of significance ($p<0.05$).

4. The flexor muscle endurance of the hip at loading of 90°/sec before and after application of I-shaped Kinesio Tape did not show the level of significance. The extensor muscle endurance of the hip at loading of 90°/sec before and after application of I-shaped Kinesio Tape showed the level of significance ($p<0.05$).

5. In comparison between application of Y-shaped taping and application of I-shaped taping, the flexor muscle strength of the hip at loading of 60°/sec did not show the level of significance. In comparison between application of Y-shaped taping and application of I-shaped taping, the extensor muscle strength of the hip at loading of 60°/sec showed the level of significance ($p<0.05$).

6. In comparison between application of Y-shaped taping and application of I-shaped taping, the flexor muscle endurance of the hip at loading of 90°/sec did not show the level of significance. In comparison between application of Y-shaped taping and application of I-shaped taping, the extensor muscle strength of the hip at loading of 60°/sec showed the level of significance ($p<0.05$).

In this study, we determined that when Kinesio Tape was applied to patients with chronic lumbago, the muscle strength and endurance of the hip at extension were improved regardless of the shape of the tape. In the future, more studies are required in more subjects, to determine the results over a period of time, and to determine to what extent the muscle strength and endurance are maintained after removal of the tape after application for a specified time.