



Original Article

Effects of active rehabilitation therapy on muscular back strength and subjective pain degree in chronic lower back pain patients

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Abstract. [Purpose] This study applied active rehabilitation therapy to muscular back strength and assessed the subjective pain degree in chronic low back pain patients. [Subjects and Methods] Subjects were randomly assigned to two groups: experimental (n=8) and control (n=8). The experimental group performed two types of rehabilitation therapy programs four times per week for eight weeks. The rehabilitation program was based on the Korea Occupational Safety and Health Agency's program. There were several types of stretching and strengthening. Back strength was measured using the Back Muscle Dynamometer TKK-5402. The visual analog scale score, selected to measure degrees of subjective pain, was used to assess treatment efficacy. [Results] For the experimental group, muscular back strength increased from 133.90 ± 11.84 kg before exercise to 145.59 ± 14.49 kg after exercise. In the control group, muscular back strength decreased from 133.92 ± 3.84 kg before exercise to 133.90 ± 5.81 kg after exercise. In the experimental group, the visual analog scale score for subjective pain decreased from 6.63 ± 0.52 before exercise to 5.75 ± 0.46 after exercise; in the control group, it decreased from 5.61 ± 0.52 before exercise to 5.61 ± 0.52 after exercise. [Conclusion] Active rehabilitation therapy is a positive intervention that can provide relief from back pain.

Key words: Rehabilitation therapy, Subjective pain degree, Lower back pain

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INTRODUCTION

Lower back pain is difficult to treat because its relapse rate is very highly influenced by the patient's strength. Pain influences flexibility, balance, and posture¹⁻⁴⁾ and is one of the musculoskeletal complaints and causes for disability globally⁵⁾. It appears in the region from the lumbar area to the sacroiliac joint, lower extremity radiating pain⁶⁾.

Lower back pain is a common health problem. The expanding socio-medical cost associated with this condition has been a serious issue in many countries^{6, 7)}. Active trunk muscle strengthening exercise for the local muscle group located in the core body around the lumbar vertebrae plays an important role in providing stability to spinal segments, and is useful for reducing functional disability in the spine. If the muscles lack stability, the patient tends to make inaccurate movements^{8, 9)}.

Previous studies have attempted to reduce back pain using exercise programs. The studies also included several patient education sessions and many different types of stretching and strengthening.

A few findings regarding the effect of exercise therapy with lower back pain in patients who had experienced health risks

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due to exposure to various adult diseases and illnesses are controversial, but the number of studies on back strength and subjective pain degree is rare. Thus, the purpose of this study was to determine the effectiveness of conventional rehabilitation therapy for lower back pain patients by analyzing their muscular back strength and subjective pain degree.

SUBJECTS AND METHODS

The subjects were allocated to two different groups, the experimental group (45.1 ± 2.23 years, 171.4 ± 5.23 cm, 71.1 ± 6.56 kg, $n=8$) and the control group (41.6 ± 4.27 years, 171.0 ± 3.23 cm, 69.3 ± 2.87 kg, $n=8$). The patients were separated based on a body fat rate of over 30%, obtained using bioelectric impedance. They did not participate in training for at least six months. This study complied with the ethical standards of the

Declaration of Helsinki, and written informed consent was received from each participant. After receiving written informed consent, a radiograph was taken on the following day. The therapy program was based on the Korea Occupational Safety and Health Agency's program¹⁰. This attempts to reduce pain using rehabilitation therapy and education sessions and several types of stretching and strengthening¹¹. Back strength was measured using the Back Muscle Dynamometer TKK-5402 (Takai, Japan). Posture was the angle of the upper 30 degrees. Full power and back strength was measured by causing the body when it is ready. It was performed twice to record a good result, 0.1 kg. Pre- and post-treatment pain intensity levels were measured using a visual analog scale (VAS). We selected the VAS score as a measure for determining subjective pain, which was used to determine the efficacy of treatment. Subjective pain degree with low back pain treatment pain score sheets were then made available for follow-up and final judgment of the patient¹².

The treatment group performed two different types of rehabilitation therapy programs for eight weeks. The rehabilitation therapy focused on core back strength and subjective pain degree. The duration was 10 seconds per repetition three repetitions for weeks 1–4, 12 seconds per repetition with three repetitions for weeks 5–6, and 15 seconds per repetitions with three repetitions for weeks 7–8, and the rehabilitation therapy was performed twice a day, four days a week. The patient performed the rehabilitation therapy before and after the eight weeks of the rehabilitation therapy program. The treatment data were evaluated using the t-test for comparisons within each group and between the groups. The significance levels were set as $p < 0.05$ in the statistical analyses.

RESULTS

In the experimental group, muscular back strength increased from 133.90 ± 11.84 kg before exercise to 145.59 ± 14.49 kg after exercise ($p < 0.01$). For the control group, back muscular strength decreased from 133.9 ± 3.8 kg before exercise 133.90 ± 5.81 kg after exercise ($p < 0.05$) (Table 1, 2).

In the experimental group, the VAS score for subjective pain decreased from 6.63 ± 0.52 VAS before exercise to 5.75 ± 0.46 VAS after exercise ($p < 0.01$). In the control group, the VAS score for subjective pain decreased from 5.61 ± 0.52 VAS before exercise to 5.61 ± 0.52 after exercise (Table 3, 4).

DISCUSSION

This study applied active rehabilitation therapy to increase muscular back strength and subjective pain degree in patients

Table 1. Comparison of back muscular strength within group (units: kg)

Group	Before	After
Experimental group	133.9 ± 11.8	$145.5 \pm 14.4^{**}$
Control group	133.9 ± 3.8	133.9 ± 5.8

* $p < 0.05$, ** $p < 0.01$

Table 2. Comparison of back muscular strength between groups (units: kg)

Group	Changes of muscular strength
Experimental group	140.4 ± 12.8
Control group	133.9 ± 4.7

Table 3. Comparison of subjective pain level within groups (units: visual analog scale)

Group	Before	After
Experimental group	6.63 ± 0.52	$5.75 \pm 0.46^{**}$
Control group	5.61 ± 0.52	5.61 ± 0.52

** $p < 0.01$

Table 4. Comparison of subjective pain level between groups (units: visual analog scale)

Group	Changes of numerical values of Subjective pain level
Experimental group	6.25 ± 0.78
Control group	5.63 ± 0.50

with chronic lower back pain. There was an increase in muscular back strength and subjective pain degree after exercise and a change of muscular back strength and subjective pain degree between the control and experimental groups. The muscular back strength and subjective pain degree were measured. The experimental groups showed a significant decrease, which is a positive result.

Rehabilitation therapy allowed activation of the abdominal muscles and multifidus, the motor muscles of the spine¹³. The tension and postural muscles are in this part of the body, and they play an important role in trunk stability and posture control when individuals perform whole-body activity. These muscles also counteract the imbalance of muscles necessary for maintaining posture¹⁴. According to the VAS after the two groups performed the core body stability exercise and combined exercise, both groups showed a significant decrease in pain. It is assumed that the two rehabilitation therapies enhanced core body stability and strengthened the back muscles significantly, and resulted in decreased back pain due to the reactivation of the core body muscle. According to this study, patients with back pain can decrease pain significantly if they regularly and continuously use rehabilitation therapy, as shown in the result. Pain results from mechanical, psychological, and degenerative factors. The back pain was found in the spine, core back muscles surrounding the spine, sacroiliac, several nerves, and many discs¹⁵.

It is indispensable for back pain patients to strengthen core back muscles and improve in lumbar flexibility. The care for back pain can depend on the type of pain. Because of the patient's job type, back pain results from injury, job stress, or loading on separate structure of the body's core. Most studies and researchers use rehabilitation therapy to evaluate the effects of back pain. Rehabilitation therapy is a significant method for back pain patients¹⁶. Research has used rehabilitation therapy and lumbar stabilizing rehabilitation therapy to increase lumbar strength and decrease pain¹⁷. The exercise improved back core muscle strength. This study found that patients with core back pain had decreased subjective pain degree and improved back muscle strength after undergoing rehabilitation therapy. There appeared to be a significant improvement in core muscular back strength and subjective pain degree in treatment patients. This finding indicated that the stretching type of rehabilitation therapy would have some additional benefits. Future studies should conduct a follow up test to comprehend how subjects maintain rehabilitation therapy so that the results can be well used by patients with back pain.

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