



Original Article

## Effects of high intensity laser therapy on pain and function of patients with chronic back pain

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**Abstract.** [Purpose] This study examined the effects of High Intensity Laser Therapy on pain and function of patients with chronic back pain. [Subjects and Methods] This study evenly divided a total of 20 patients with chronic back pain into a conservative physical therapy group that received conservative physical therapy, and a high intensity laser therapy group that received High Intensity Laser Therapy after conservative physical therapy. All patients received the therapy three times a week for four weeks. For the high intensity laser therapy group, treatment was applied to the L1–L5 and S1 regions for 10 minutes by using a high intensity laser device while vertically maintaining the separation distance from handpiece to skin at approximately 1 cm. A visual analog scale was used to measure the pain and Oswestry Disability Index was used for functional evaluation. [Results] In a within-group comparison of the conservative physical therapy and high intensity laser therapy groups, both the visual analog scale and Oswestry Disability Index significantly decreased. In a between-group comparison after treatment, the high intensity laser therapy group showed a significantly lower visual analog scale and Oswestry Disability Index than the conservative physical therapy group. [Conclusion] High Intensity Laser Therapy can be an effective non-surgical intervention method for reducing pain and helping the performance of daily routines of patients who have chronic back pain.

**Key words:** Low back pain, High intensity laser therapy, Oswestry disability index

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### INTRODUCTION

Back pain is a frequently observed disease. Statistics tell us that most people have experienced back pain at least once in their lifetime. The disease affects almost all age groups, inflicting mental and physical burdens on people<sup>1)</sup>. Risk factors of spinal pain include physical characteristics, general medical health, mental condition, and working environmental factors where age, weight, injury, occupation, or posture can make people experience the pain<sup>2)</sup>. Back pain resulting from these factors causes productivity loss and impairment of quality of life as it limits mobility in people's daily routines<sup>3)</sup>. Symptoms of back pain not only affect sacroiliac articulation and the lumbar region, but also accompany radiating pain that progresses to the lower limbs<sup>4)</sup>. Popular treatments for back pain include acupuncture, traction, percutaneous electrical nerve stimula-

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**Fig. 1.** The high intensity laser therapy

**Table 1.** Comparison of the VAS and ODI within each group at the HILT

	Group	Pre	Post
VAS (point)	CPTG	7.0 ± 1.2	6.2 ± 1.4 <sup>aa</sup>
	HLTG	7.0 ± 0.8	3.4 ± 0.8 <sup>aa,bb</sup>
ODI (%)	CPTG	31.6 ± 11.5	29.6 ± 10.7 <sup>aa</sup>
	HLTG	33.1 ± 13.0	19.0 ± 10.6 <sup>aa,b</sup>

VAS: Visual Analog Scale; ODI: Oswestry Disability Index; CPTG: Conservative Physical Therapy Group; HLTG: High-intensity Laser Therapy Group; <sup>aa</sup>p<0.01, paired t-test; <sup>b</sup>p<0.05, independent sample t-tests; <sup>bb</sup>p<0.01

tion, massage, ultrasonic waves, and low-intensity laser treatment. Surgery is recommended when these treatment methods are ineffective or when symptoms are very severe<sup>5</sup>). High Intensity Laser Therapy (HILT) has photochemistry effects that stimulate oxidation of mitochondria and ATP creation by delivering high energy output inside tissues. HILT can cause quick absorption of edema and removal of exudates through increased metabolism and blood circulation<sup>6</sup>). Although many nonsurgical treatments for chronic back pain have been introduced so far, there is a paucity of research on HILT. To help answer this shortcoming, this study conducted an experiment to prove the effects of HILT on patients with chronic back pain.

## SUBJECTS AND METHODS

Among the hospitalized patients and outpatients in S Orthopedics located in Daegu City, Korea, research subjects of this study included 20 patients between the ages of 30 and 65 who were diagnosed by their doctors with chronic back pain, based on clinical findings and X-ray findings that persisted for more than three months. Excluded from the sample were patients who had surgical history in the lumbar region, had a spinal tumor or disc infection, or had inflammatory diseases such as rheumatism as well as those who had previous fractures and those who had contraindications for manual therapy. Ethical approval for the study was granted by the U1 University institutional review board. All subjects read and signed consent forms, in accordance with the ethical standards of the Declaration of Helsinki.

The patients with chronic back pain were randomly and evenly divided into a Conservative Physical Therapy Group (CPTG) that received conservative physical therapy, and a High-intensity Laser Therapy Group (HLTG) that received both conservative physical therapy and HILT. The treatment was applied three times a week for a total of four weeks. The CPTG subjects had an mean age of 47.1 ± 9.6 years, an mean height of 164.4 ± 10.0 cm, and an mean weight of 62.7 ± 15.6 kg. For the HILT subjects, mean age was 48.3 ± 9.0 years, mean height was 160.13 ± 5.5 cm, and mean weight was 62.6 ± 10.2 kg. CPTG received a 20-minute hot pack treatment, 15-minute interference wave treatment, and 5-minute deep heat injection treatment using ultrasonic waves. HLTG received high intensity laser therapy after the identical conservative physical therapy was applied. A HILT device (SALUS-Heallaser, Remed Inc.) was applied to the L1–L5 and S1 regions for 10 minutes while vertically maintaining the separation distance from handpiece to skin at approximately 1 cm. The laser was applied in three phases including initial phase, trigger point, and final phase, with a total energy of 1,378 mJ/cm<sup>2</sup> (Fig 1). All patients received therapy three times a week for four weeks.

In this study, a Visual Analogue Scale (VAS) was used to investigate the intensity of pain and the Oswestry Disability Index (ODI) was used to evaluate the function of patients with chronic back pain. VAS and ODI of both of CPTG and HLTG were measured before and after the four-week treatment using identical methods. As for the statistical analysis in this study, paired t-test was conducted to examine the within-group change and independent t-test was conducted for the between-group comparison. SPSS/PC Ver. 13.0 was used for statistical treatment in this study where significance level  $\alpha$  was set at 0.05.

## RESULTS

In this study, VAS and ODI significantly decreased in a within-group comparison of CPTG and HLTG (p<0.05). In a between-group comparison after the treatment, VAS and ODI of HLTG were significantly lower than CPTG (p<0.05) (Table 1).