

## Original Article

# Comparison between Epidural Block vs. High Intensity Laser Therapy for Controlling Chronic Low Back Pain

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## Abstract

**Background:** Chronic low back pain is among a wide spread musculoskeletal conditions that is related to disability with high economy cost. There are several treatment modalities for controlling chronic low back pain (CLBP), among them high intensity laser therapy (HILT) and epidural blocks (EB) use more commonly. This study aimed to evaluate the benefits and hazards of each of these two methods.

**Materials and Methods:** We designed a randomized controlled double blind study during 24 months. 101 patients divided in 2 groups (52 in EB and 49 in HILT group). Pain intensity was assessed by using faces pain scales (FPS) and LINKERT questionnaires' before procedure and during one, four, 12, and 24 weeks after beginning the procedures.

**Results:** There were no differences between two groups in FPS lumber tenderness, straight leg rising test (SLRT), paresthesia, deep tendon reflex (DTR), and imaging changes. Motor problems seem was less in HILT group comparing EB.

**Conclusion:** This study showed both EB and HILT approaches can control the pain intensity and motor activities in CLBP patients. Future studies will clarify the precise importance of each these methods.

**Keywords:** low back pain, pain control, high intensity laser therapy, epidural block

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## Introduction

Chronic low back pain is a widespread musculoskeletal condition that is related to disability with high economy cost in western countries<sup>1</sup>. Prevalence of chronic low back pain is about 15-45% in United States and 36.5-49.1% in Britain<sup>1,2</sup>. About 85% of patients with low back pain termed as non specific low back pain with no nerve root pain and other spine disorders<sup>3</sup>. Chronic low back pain (CLBP) is defined as pain in the lumbosacral spine

with more than 12 weeks' duration. The pain may or may not be referred to other locations, and it usually causes limitations in range of motion (ROM)<sup>4</sup>.

There are several modalities in treatment of chronic low back pain like: changing lifestyle, physical therapy modalities such as massage, superficial heat or cold, exercise, laser therapy and epidural injection of analgesic agents, NSAIDs or steroids<sup>5,6</sup>. Epidural blocks (EB) are an option in combination with other treatments like physiotherapy. Epidural injection of Bupivacaine decreases motor problems due to

injection<sup>7</sup>.

Laser is a safe, easy and painless treatment for many conditions such as rheumatoid arthritis, chronic osteoarthritis, carpal tunnel syndrome, fibromyalgia, knee injury, shoulderpain, and postoperative pain<sup>8,9</sup>. Studies show that low level laser therapy can reduce inflammation, pain and improve function with increasing microcirculation, activating angiogenesis, and stimulating immunological processes and nerve regeneration<sup>8,10</sup>. Recently high intensity laser therapy(HILT) was introduced for physical therapy. HILT is able to reach and treat areas that low level laser therapy can't such as large and/or deep joints<sup>11</sup>. This randomized, double blinded study was designed to compare the effect of HILT with epidural injection of Bupivacaine and Methyl Prednisolone Acetate in treatment of chronic low back pain.

## Methods

A randomized double-blinded study was designed. Patients diagnosed with chronic low back pain were referred to pain clinic of Labbafinejad medical center in two years period between May 2012 till May 2014. The inclusion criteria were patients with a history of chronic low back pain for at least 3 months.<sup>4</sup> Patients with a history of degenerative disc disease, disc herniation, spinefracture, spondylosis, spinal stenosis, neurological deficits, abnormal laboratory findings, and systemic and psychiatric illnesses were excluded<sup>12</sup>.

This study included 101 patients was referred with CLBP who were assigned specific identification

numbers and randomized into two groups using a GraphPad program (GraphPad Software, Inc., San Diego, CA, USA). Patients did not know to which group they were assigned or which treatment they would be offered. Group A was treated with epidural injection of 4 ml. 0.625% Bupivacaine and 80 mg. Methyl Prednisolone Acetate (Epi) and group B was treated with HILT as approved protocol. The entire treatment session was divided into 3 different phases as initial, intermediate (antalgic), and final treatment phase.

For the assessment of pain intensity two qualitative and quantitative questionnaires were used. Faces pain scales (FPS) was the qualitative method that was based on patients faces mimic during examination that physician observed and scale the pain severity between 1 to 10 points. Another method was LINKERT questionnaires' that filled by patient. Both questionnaires were asked before procedures, one, four, 12, and 24 weeks after procedure. Questioner was blind to each patient's group.

For assessment and comparing the effect of two modalities in changing in physical examination, we examined the patients before procedures, one, four, 12, and 24 weeks after procedures. Physical examinations include lumbar tenderness, straight leg rising test (SLRT), motor problem, paresthesia and deep tendon reflex (DTR).

All analyses were performed using Statistical Package for the Social Sciences (SPSS) for Windows, version 16. The level of statistical significance was set at  $P < 0.05$ .

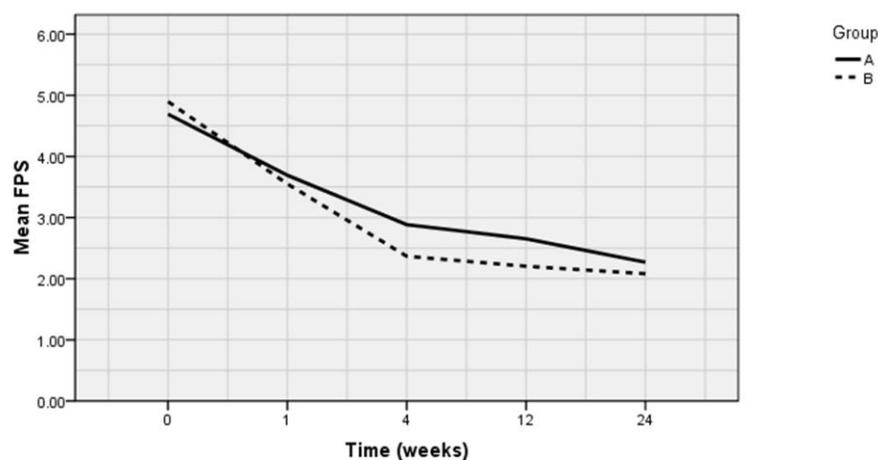


Figure 1. The plot of FPS for two groups during the time

**Table 1:** Characteristics of patients in different groups.

Variable	Total (n=101)	A (n=52)	B (n=49)	P value
<b>Age</b>				0.767
40-50	11(10.9)	6(11.5)	5(10.2)	
50-60	45(44.6)	21(40.4)	24(49)	
60-70	37(36.6)	22(42.3)	15(30.6)	
>70	8(7.9)	3(5.8)	5(10.2)	
<b>Sex</b>				0.305
Male	36(35.6)	21(40.4)	15(30.6)	
Female	65(64.4)	31(59.6)	34(69.4)	
<b>Duration of involvement</b>				0.136
< 6 m	7(6.9)	5(9.6)	2(4.1)	
6-12 m	4(4)	1(1.9)	3(6.1)	
12-24	28(27.7)	18(34.6)	10(20.4)	
>24 m	62(61.4)	28(53.8)	34(69.4)	
<b>Hx. Back surgery</b>	8(7.9)	4(7.7)	4(8.2)	>0.999
<b>Hx. Medical TR</b>	88(87.1)	42(80.8)	46(93.9)	0.160

## Results

A total of 101 patients participated in this study. 52 patients were in group A (epidural injection of Bupivacaine and Methyl Prednisolone Acetate) and 49 patients were in group B (HILT). Distribution of age in both groups is seen in table 1. There was no difference between age distribution in both groups ( $P$  value=0.767). There was no significant differences between sex distribution, duration of involvement, history of back surgery and history of medical treatment in both groups (Table 1).

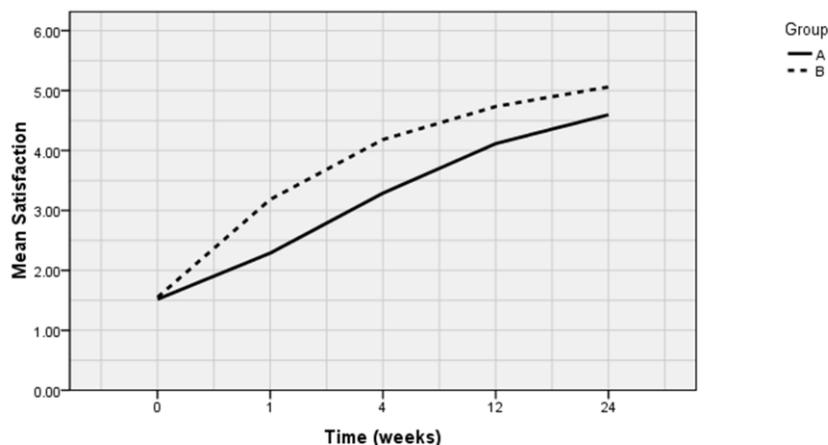
There was no difference in faces pain scales (FPS) between two groups before and after treatment

( $P>0.05$ ). Table 2 shows details of FPS in both groups. LINKERT scaling showed significant difference between two groups ( $P<0.001$ ) (Figure 1).

Data analysis showed no differences between two groups in lumbar tenderness, straight leg rising test, paresthesia and deep tendon reflex before and after both treatment modalities (Table 3).

Based on LINKERT criteria for pain assessment, pain relief in HILT group was significantly more than epidural group ( $P<0.001$ ). Patients satisfaction in HILT group was more than epidural group from first week to 24 weeks after treatment ( $P<0.05$ ) (Figure 2).

## Discussion



**Figure 2.** The plot of Satisfaction for two groups during the time

This study was designed for assessing the efficacy of HILT in treatment of chronic low back pain and comparing HILT with epidural treatments. We assessed the efficacy of both modalities 1, 4, 12, and

24 weeks after treatment. There was no difference between two groups in FPS (facial pain scales), lumbar tenderness, SLRT, paresthesia, DTR and

**Table 2: Comparison of the response variables between two groups in different times**

Variable	Total (n=101)	A (n=52)	B (n=49)	P-value
<b>FPS</b>				
<b>First</b>				
1-3	2(2)	2(3.8)	0(0)	0.868
3-5	61(60.4)	32(61.5)	29(59.2)	
5-7	34(33.7)	16(30.8)	18(36.7)	
7-10	4(4)	2(3.8)	2(4.1)	
<b>1 week</b>				
1-3	23(22.8)	9(17.3)	14(28.6)	0.690
3-5	74(73.3)	42(80.8)	32(65.3)	
5-7	4(4)	1(1.9)	3(6.1)	
7-10	0(0)	0(0)	0(0)	
<b>4 weeks</b>				
1-3	70(69.3)	30(57.7)	40(81.6)	0.437
3-5	30(29.7)	21(40.4)	9(18.4)	
5-7	1(1)	1(1.9)	0(0)	
7-10	0(0)	0(0)	0(0)	
<b>12 weeks</b>				
1-3	80(79.2)	36(69.2)	44(89.8)	0.363
3-5	20(19.8)	15(28.8)	5(10.2)	
5-7	1(1)	1(1.9)	0(0)	
7-10	0(0)	0(0)	0(0)	
<b>24 weeks</b>				
1-3	93(92.1)	46(88.5)	47(95.9)	>0.999
3-5	7(6.9)	5(9.6)	2(4.1)	
5-7	1(1)	1(1.9)	0(0)	
7-10	0(0)	0(0)	0(0)	
<b>LIKERT</b>				
First	1.6±0.5	1.6±0.5	1.6±0.6	0.555
1 week	2.5±0.8	2.1±0.7	2.9±0.7	<0.001
4 weeks	3.4±1.0	2.9±1.0	3.9±0.6	<0.001
12 weeks	3.9±0.9	3.5±1.0	4.3±0.7	<0.001
24 weeks	4.3±0.8	4.0±0.9	4.6±0.5	<0.001
<b>Physical Exam Lum.</b>				
<b>TEND</b>				
First	79(78.2)	44(84.6)	35(71.4)	0.109
1 week	48(48)	30(57.7)	18(37.5)	0.043
4 weeks	17(16.8)	11(21.2)	6(12.2)	0.232
12 weeks	2(2)	1(1.9)	1(2)	>0.999
24 weeks	2(2)	0(0)	2(4.1)	0.233
<b>SLRT</b>				
First	24(23.8)	12(23.1)	12(24.5)	0.868
1 week	21(20.8)	10(19.2)	11(22.4)	0.690
4 weeks	13(12.9)	8(15.4)	5(10.2)	0.437
12 weeks	5(5)	4(7.7)	1(2)	0.363
24 weeks	2(2)	1(1.9)	1(2)	>0.999
<b>Motor Problem</b>				
First	97(96)	10(19.2)	14(28.6)	0.052
1 week	96(95)	51(98.1)	45(91.8)	0.196
4 weeks	76(75.2)	42(80.8)	76(75.2)	0.185
12 weeks	40(39.6)	27(51.9)	40(39.6)	0.009
24 weeks	24(23.8)	19(36.5)	24(23.8)	0.002
<b>Paresthesia</b>				
First	24(23.8)	10(19.2)	14(28.6)	0.351
1 week	14(13.9)	6(11.5)	8(16.3)	0.486

<b>4 weeks</b>	9(8.9)	4(7.7)	5(10.2)	0.736
<b>12 weeks</b>	4(4)	2(3.8)	2(4.1)	>0.999
<b>24 weeks</b>	3(3)	2(3.8)	1(2.1)	>0.999
<b>DTR</b>				
<b>First</b>				0.701
<b>Up</b>	27(26.7)	14(26.9)	13(26.5)	
<b>Normal</b>	19(18.8)	11(21.2)	8(16.3)	
<b>Down</b>	55(54.5)	27(51.9)	28(57.1)	
<b>1 week</b>				0.271
<b>Up</b>	24(23.8)	13(25)	11(22.4)	
<b>Normal</b>	27(26.7)	17(32.7)	27(26.7)	
<b>Down</b>	50(49.5)	22(42.3)	50(49.5)	
<b>4 weeks</b>				0.051
<b>Up</b>	17(16.8)	9(17.3)	8(16.3)	
<b>Normal</b>	38(37.6)	25(48.1)	13(26.5)	
<b>Down</b>	46(45.5)	18(34.6)	28(57.1)	
<b>12 weeks</b>				0.211
<b>Up</b>	15(14.9)	7(13.5)	8(16.3)	
<b>Normal</b>	44(43.6)	27(51.9)	17(34.7)	
<b>Down</b>	42(41.6)	18(34.6)	24(49)	
<b>24 weeks</b>				0.330
<b>Up</b>	13(12.9)	7(13.5)	6(12.2)	
<b>Normal</b>	50(49.5)	29(55.8)	21(42.9)	
<b>Down</b>	38(37.6)	16(30.8)	22(44.9)	
<b>Imaging</b>				
<b>First</b>				0.022
<b>Yes</b>	80(79.2)	40(76.9)	40(81.6)	
<b>No</b>	14(13.9)	11(21.2)	3(6.1)	
<b>None</b>	7(6.9)	1(1.9)	6(12.2)	
<b>1 week</b>				0.056
<b>Yes</b>	80(79.2)	40(76.9)	40(81.6)	
<b>No</b>	13(12.9)	10(19.2)	3(6.1)	
<b>None</b>	8(7.9)	2(3.8)	6(12.2)	
<b>4 weeks</b>				0.027
<b>Yes</b>	78(77.2)	39(75)	39(79.6)	
<b>No</b>	14(13.9)	11(21.2)	3(6.1)	
<b>None</b>	9(8.9)	2(3.8)	7(14.3)	
<b>12 weeks</b>				0.036
<b>Yes</b>	79(78.2)	39(75)	40(81.6)	
<b>No</b>	14(13.9)	11(21.2)	3(6.1)	
<b>None</b>	8(7.9)	2(3.8)	6(12.2)	
<b>24 weeks</b>				0.036
<b>Yes</b>	79(78.2)	39(75)	40(81.6)	
<b>No</b>	14(13.9)	11(21.2)	3(6.1)	
<b>None</b>	8(7.9)	2(3.8)	6(12.2)	
<b>Satisfaction</b>				
<b>First</b>	1.5±0.6	1.5±0.6	1.5±0.6	0.772
<b>1 week</b>	2.7±0.9	2.3±0.8	3.2±0.7	<0.001
<b>4 weeks</b>	3.7±1.0	3.3±1.1	4.2±0.7	<0.001
<b>12 weeks</b>	4.4±1.0	4.1±1.1	4.7±0.8	0.004
<b>24 weeks</b>	4.8±0.9	4.6±1.0	5.1±0.7	0.018

imaging while patients in HILT group experienced less pain than other group based on Linkert pain scaling. Motor problem in HILT group was less than epidural group in 12 and 24 weeks after treatment. Finally patients in HILT group were more satisfied compared with epidural group.

Chronic low back pain is a common problem with a variety of underlying etiology. Active physiotherapy is an important part of treatment but patients need

decreasing level of pain before it<sup>13</sup>. Epidural injection of anesthetic agents is a common option for pain relief<sup>14</sup>. Stanton-Hicks showed that epidural pain relief had positive effects on physiotherapy results and patient's morbidity<sup>14</sup>. Sufficient analgesia and duration of action are important factors in selecting drugs for epidural injection. Some studies showed that Bupivacaine is useful for epidural block in chronic low back pain<sup>15</sup>. Motor block and systemic toxicity are the

**Table 3:** The Odds Ratio of being in the upper category at any level of responses; according to the GEE analysis.

Response	OR	CI 95%	P-value
FPS			
Group(A/B)	2.74	1.53-4.89	<b>0.001</b>
Time	0.85	0.81-0.89	<b>&lt;0.001</b>
LIKERT			
Group(A/B)	0.18	0.104-0.304	<b>&lt;0.001</b>
Time	1.18	1.147-1.212	<b>&lt;0.001</b>
Physical Exam Lum. TEND			
Group(A/B)			
Time	1.89	0.90-3.98	<b>0.091</b>
	0.75	0.64-0.88	<b>&lt;0.001</b>
SLRT			
Group(A/B)	1.08	0.42-2.79	<b>0.876</b>
Time	0.88	0.82-0.94	<b>&lt;0.001</b>
Motor Problem			
Group(A/B)	2.87	1.47-5.57	<b>0.002</b>
Time	0.86	0.83-0.88	<b>&lt;0.001</b>
Paresthesia			
Group(A/B)	0.67	(0.21-2.10)	<b>0.497</b>
Time	0.92	(0.88-0.98)	<b>0.006</b>
DTR			
Group(A/B)	0.68	0.297-1.570	<b>0.369</b>
Time	0.99	0.96-1.01	<b>0.363</b>
Satisfaction			
Group(A/B)	0.249	0.148-0.419	<b>&lt;0.001</b>
Time	1.171	1.139-1.203	<b>&lt;0.001</b>

most important complications in epidural pain relief<sup>15,16</sup>.

Low intensity laser therapy is used for treatment of patients with chronic low back pain and decreases pain level<sup>17</sup>. Recently HILT is used for wide range of conditions like wound healing, shoulder pain and arthritis<sup>17,18</sup>. Laser light that is used in HILT spread from skin to target region like joints and increases the mitochondrial oxidative reaction and adenosine triphosphate (ATP), RNA, and DNA production that lead to tissue stimulation and repair<sup>19</sup>.

In current study we compare the effect of epidural Bupivacaine and HILT in treatment of low back pain. Based on our research in data base there are no RCT that compare epidural block and HILT. Pain relief in this study based on FPS scaling was not significant in HILT group comparing with epidural group while LINKERT scaling in pain showed significant pain relief in HILT group rather than other group. LINKERT based pain decrease in HILT group was compatible with other studies showed the effect of HILT in decreasing pain like study was done by Salaheldien et al. that they showed that HILT significantly decreased pain in contrast with

placebo.<sup>20</sup> Fiore et al. compare HILT and ultrasound therapy in treatment of low back pain and showed HILT group significantly decreased pain compared with ultrasound<sup>21</sup>.

Mohamed Salaheldien et al. in their study showed that HILT improved range of motion significantly more than placebo group<sup>19</sup>, while in our study there was no difference between two groups in parameters like lumbar tenderness, SLRT, paresthesia and deep tendon reflex. Improving motor problem was seen in HILT group in 12 and 24 weeks after treatment that was significant comparing with epidural group (P<0.05). Satisfaction criteria showed that HILT significantly is better than epidural group.

## Conclusion

Although more RCT studies are needed to evaluate and compare HILT and epidural block in treatment of chronic low back pain, the results of present study showed that HILT could be a good substitute for epidural block in treatment of chronic low back pain. Our result encourages us to design other studies with greater samples and longer follow up.

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