# Effects of High and Low Power Laser in Treating Acute and Subacute Lumbar Disc Herniation

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## ABSTRACT

**Background:** lumbar disc herniation (LDH) is a common cause of low back pain (LBP). Low and high power laser are among the modalities having significant effects in pain reduction and disability in LDH. **Purpose:** To study the effects of high power laser (HPL) and low power laser (LPL) combined with core stability exercises on pain, back disability, lumbar range of motion and angle of straight leg raising, in patients with acute and subacute LDH. **Patients and Methods:** This study was conducted at the outpatient clinic, Faculty of physical therapy, Badr University between October 2021 and April 2022. Sixty male and female patients with acute or subacute LDH were included in the study. Patients were randomly assigned into three groups (A, B and C) receiving either HPL, LPL or placebo combined with core stability exercise. Visual analogue scale (VAS), Oswestry disability index (ODI), Angle of straight leg raising (SLR) and back range of motion instrument (BROM) were used to assess patients. Patients received 3 sessions per week for 4 weeks. **Results:** There was a significant decrease in VAS and ODI scores in HPL and LPL groups compared with that of placebo group. Albeit, were reported a significant decrease in HPL group compared with LPL group. Moreover, there was a significant increase in SLR and back ROM in HPL group compared with that of LPL group and placebo group and a significant increase in SLR and back ROM of LPL group compared with that of placebo group. **Conclusion:** HPL is more effective than LPL and placebo in treating patients with LDH.

**Key Words:** Lumbar disc herniation; High power laser; Low power laser; Core stability exercise.

## INTRODUCTION

Lumbar disc herniation (LDH) is a known cause of low back pain (LBP). It has a negative effect on the quality of life **(1; 2; 3)**. LDH is more common among adults between the ages of 30 to 50, and among males than females by a ratio 2:1. About 95 % of herniated discs in adults aged 25 to 55 years occur in the lower lumbar spine; disc herniation in upper levels is more common in people over 55 years. **(4).**

LASER treatment has been utilized to treat musculoskeletal disorders (MSD). LASER therapy is a noninvasive procedure for treatment of acute and chronic musculoskeletal pain, However, there is controversial about its analgesic effect **(5); (6); (7).**

Low-power LASER therapy (power ≤ 500 mW) can be used to reduce acute and chronic pain, stimulate nerve regeneration, improve peripheral circulation and metabolism, and minimize joint inflammation. HPLT lately has been utilized in physiotherapy therapeutic procedures. The fundamental difference between HPLT and LPLT is that the power of the beam (power >500 mW) allowing a deeper penetration, delivering the desired energy to deeper tissues in less amount of time. (8)**.**

High power laser therapy improves lumbar segment mobility, angle of straight leg raising, and overall function in patients with lumber disc herniation (9)**.** LPLT shows better improvement in visual analogue scale (VAS), lumbar segment motion and back disability in patients with acute LBP with radiculopathy (10)

In patients with chronic Non-specific low back pain, low and high power LASER have been proven to be beneficial in decreasing pain and disability, as well as improving lumbar ROM and quality of life. (11)**.** Therefore, the purpose of the study was to investigate the effect of high power and low power laser on back pain, back disability, lumbar range of motion, angle of straight leg raising, in patients with acute and subacute LDH.

## Material and methods:

**Study Design**

Single blinded randomized clinical trial was conducted at the outpatient clinic of faculty of physical therapy Badr University.

**Participants**

The sample size was calculated using the G*Power software (version 3.0.10). Sixty male and female patients with acute (less than 6 weeks) or subacute (from 6 weeks until 12 weeks) lumber disc herniation with unilateral leg pain, their ages ranged between 25 and 45 years. All participant was referred by an orthopedic surgeon, who was responsible for diagnosis of LDH and the diagnosis was confirmed by MRI, the participants were allocated using online random generator into three groups.

**Group A (n=20):** Patients received HPLT combined with a core stability exercise program.

**Group B (n=20):** Patients received LPLT combined with a core stability exercise program.

**Group C (n=20):** Patients received placebo laser therapy combined with a core stability exercise program.

Patients were included in the study if they aged between 25 to 45 years, BMI between 25-29.9 kg/m2, had lumbar disc herniation referred by an orthopedic surgeon and with MRI confirming the diagnosis, Patient should have LBP with unilateral radicular pain, suffering from subacute < 3month or acute episode that last less than 6 weeks and with no history of rehabilitation 1 month before the study.

Patients were excluded if they had spondylolisthesis, spinal canal stenosis, fracture or spondylolysis, spinal tuberculosis and tumor, had lumbar spinal fusions, bilateral radiating pain, or autoimmune diseases.

1) **Instrumentations**
   A. High power laser therapy
      A Zimmer Opton pro, integrated High-power class IV laser device (serial N: 15200013306 & REF: 4682, made in Germany, manufactured by Zimmer

MedizinSysteme). It emits radiation in the infrared range to deliver topical heating and raise tissue temperature. The simultaneous application of two wavelengths of laser light (810 and 980nm) provides the user with a huge variety of therapy options.

B. Low power laser therapy
A gallium-aluminum-arsenide (GaAlAs, infrared laser) Single Laser Diode with an 850 nm wavelength, 200 mW power with a 1 cm spot size was used (Chattanooga Group, manufactured in USA, model 27841).

C. Visual analogue scale
Is a valid and reliable pain measurement scale **(12, 13)**, a self-described scale, consisting of a horizontal line, ten cm long. The extremes of the line are labeled as no pain and worst pain (14)**.**

D. Arabic version of Oswestry Disability Index (ODI)
Back disability assessment was done using Arabic version of ODI, which is a valid and reliable tool for LBP patients. Every item is given a score of 0–5 points based on its exact location, total score ranging from 0 - 50, and intense dysfunction represents a high score (15)**.**

E. The Back Range of Motion Instrument (BROM)
Is a valid device for measuring lumbar ROM in LBP patients (16)**.** The BROM is reliable in measuring lumbar flexion and side bending. This instrument, which combines an inclinometer and a goniometer, allows you to measure lumbar motion in all planes independently (17)**. (**Manufactured by baseline, Sunrise Industries, Delhi, India).

F. Bubble inclinometer
Inclinometer was used to measure the angle of straight leg raising. Inclinometer is a valid tool for measuring passive hip range of motion (18)**.** Inclinometer is a reliable tool for determining limb elevation angle during the SLR neuro-dynamic test (19)**.**
(Manufactured by baseline, Sunrise Industries, Delhi, India).

**2) Procedures**

Following an initial check for inclusion/exclusion criteria, patients were asked to participate in the study. Patients who agreed to participate were randomly allocated to one of the study groups. For the aim of blinding, following allocation, patients were given information about their groups of allocation. If they confirmed they would continue. They were asked to sign an informed consent.

**3) Measurement Procedures**

Patients in the 3 groups of the study were evaluated pre, after 6 sessions (post I), and after 12 sessions (post II).

Pain measurement: patients were asked to mark the point that exactly matched his/her pain (20)

Disability measurement: Arabic version of ODI was given to the patients then they were asked to give every aspect a score from 0-5 based on his dysfunction, with a total score ranging from 0 - 50, high score represents high level of disability. Index including physical parameters (lifting, walking, sitting, standing and sleeping), pain, functioning in everyday life (personal care, sex life and travel) and aspects of social functioning (15)**.** The index was determined by dividing the total potential score by the sum of the individual scores, then multiplying by 100 and expressing the result as a percentage (21)**.**

Back ROM measurement: in flexion and extension, the inclinometer was attached to the sacrum S1, unit was secured to the body by straps. Extended arm is inserted into the distal portion of the unit and fixed at T12 to guide the protractor, then the patients were asked to bend forward and to extend back and the angle was recorded. During rotation, BROM device with a compass and goniometer used. The device was fixed at the level of T12 and a magnet was suspended at the level of S1. Patients were asked to rotate right and left and the angle was recorded. For side bending, the BROM device is fixed at T12, and degrees of motion were recorded from posterior by the gravity goniometer as shown in figure (1).

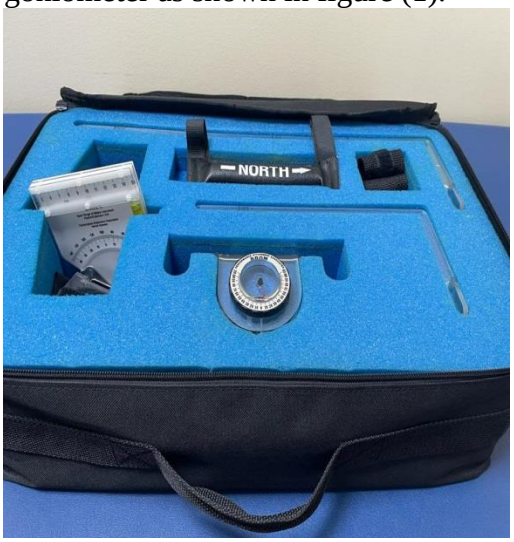


**Fig. (1): Back Range of Motion Instrument Unit.**

Angle of straight leg raising was measured by inclinometer that was attached by straps to the patient ankle. Inclinometer was set to zero allowing the fluid to come to rest. The patient was positioned in supine lying. The examiner lifted the leg into hip flexion with knee extension until the examiner found significant resistance or the patient reported a reproduction of the presenting symptoms, whichever came first. Then the angle was recorded as shown in figure (2). (22)

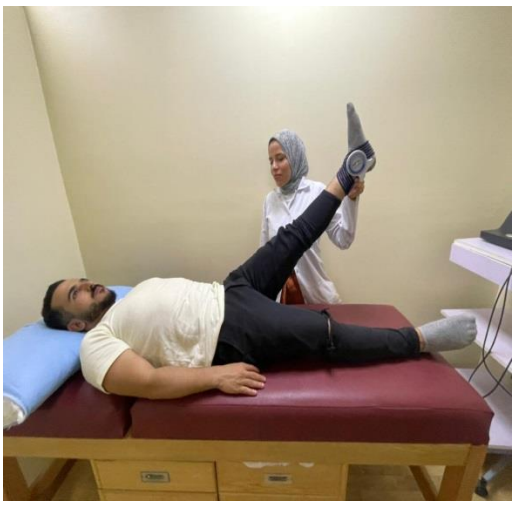

**Fig. (2): Angle of Straight Leg Raising Measurement.**

**4) Treatment Procedures:**

The subject was lying prone, exposing the treatment area and pillows were kept under the head and ankles for relaxation; the lumbar area was scrubbed with alcohol pad as shown in figure (3). Ten points in the lower back were irradiated (five points on each side) 2cm from the spinous process. The laser irradiation points were L1, L2, L3, L4 and L5 (right side), L1, L2, L3, L4 and L5 (left side). 3 sessions per week for 4 weeks (12 sessions).

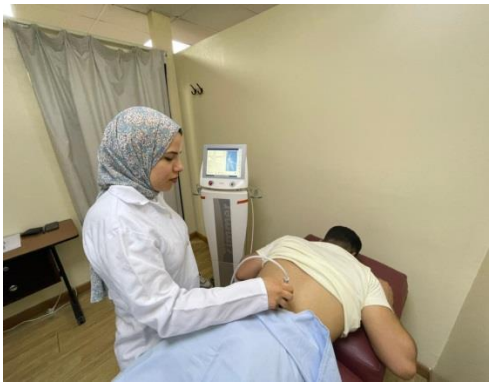

**Fig. (3): Application of Laser Therapy.**

**Group (A)** Patients received HPLT and core stability exercises. The laser probe - with the small spacer (3.1cm2) – was applied perpendicularly on the skin, with parameters of 3watts, 5Hz, 50% duty cycle, 20 joule/ point for 13 seconds with 6.4 j/cm2 was used (23)**.**

**Group (B)** Patients received LPLT and core stability exercises. A 850 nm gallium–

aluminum–arsenide laser was used to treat patients for 4 minutes at each point, delivering roughly 40 J/cm2 of energy. A laser device with a 16 Hz pulse frequency was used. The total energy applied to the patients throughout a session was 400 J (24)**.**

**Group (C)** Patients received placebo laser and core stability exercises.

**The core stability Exercise program was applied for three groups:** All exercises were performed within a limited range of motion, according to each patient's pain limits and they were allowed to rest for 2 minutes after each exercise.

The first two weeks' core stability exercises include Hollowing exercise program. Patients were instructed to draw in his/her lower abdomen below navel slowly and gently, without moving back, and pelvis. in various positions: crook-lying position, standing position, sitting position and 4-point kneeling position. Each item in the exercise was performed 20 repetitions, each taking 15 seconds. This was repeated two times. (25)**.** Extension exercise include lying prone spine extension for 25 seconds (26)**.**

The second two weeks' core stability exercises include lumbar dynamic strengthening exercises; patient was asked to draw his/her belly button to spine and then raise one leg graduated to both legs for 10 repetitions (27)**,** Abdominal curl with knee flexion 12 consecutive repetitions (28)**,** Quadruped position arm raise or leg raise graduated to opposite arm and leg raises for 25 seconds (26) and active hamstring stretching for 3 min, 3 sets, 30 secs in each leg (29)**.**

**Data Analysis**

Analysis of variance (ANOVA) was conducted for comparison of subject characteristics between groups. Chi- squared test was used for comparison of sex distribution between groups. All variables were normally distributed and variances were homogenous. ANOVA was performed to compare within and between groups effects on VAS, ODI, back ROM, and SLR. Post-hoc tests using the Bonferroni correction were carried out for subsequent multiple comparison. All statistical analysis was conducted through the statistical package for social studies (SPSS) version 25 for windows (IBM SPSS, Chicago, IL, USA). The level of significance for all statistical tests was set at $p < 0.05$.

## RESULTS

***Subject characteristics*:**

60 patients with acute and subacute LDH with demographics as shown in table (1)

The subject characteristics of group A, B and C. There was no significant difference between groups in age, weight, height, BMI, and sex distribution ($p > 0.05$).

**Table 1. Basic characteristics of participants.**

| | **Group A** | **Group B** | **Group C** | **p-value** |
|---|---|---|---|---|
| **Age, mean ± (SD), years** | 34.95 ± 5.95 | 33.25 ± 5.82 | 33.75 ± 5.04 | 0.62 |
| **Weight, mean ± (SD), kg** | 76.3 ± 7.82 | 77.3 ± 8.47 | 75.8 ± 8.47 | 0.84 |
| **Height, mean ± (SD), cm** | 167.3 ± 7.41 | 168.45 ± 7.72 | 167.25 ± 7.69 | 0.85 |
| **BMI, mean ± (SD), kg/m²** | 27.19 ± 1.11 | 27.2 ± 0.81 | 27.01 ± 0.89 | 0.77 |
| **Sex, n (%)** | | | | |
| **Females** | 11 (55%) | 11 (55%) | 13 (65%) | 0.76 |
| **Males** | 9 (45%) | 9 (45%) | 7 (35%) | |

**P< 0.05; SD, standard deviation**

**<u>Effect of treatment on VAS, ODI, back ROM, and SLR:</u>**

There was a significant interaction of treatment and time ($F = 12.58$, $p = 0.001$).

There was a significant main effect of time (F = 491.62, p = 0.001). There was a significant main effect of treatment (F = 20.32, p = 0.001).

**Within group comparison**

There was a significant decrease in VAS and ODI and a significant increase in SLR in the three groups at post II compared with that pre treatment and post I (p < 0.001) and a significant difference between pre treatment and post I (p < 0.001). (Table 2).

There was a significant increase in back ROM in the three groups at post II compared with that pre treatment and post I (p < 0.001) and a significant difference between pre treatment and post I (p < 0.01). (Table 3).

**Table 2.** ***Mean VAS, ODI and SLR pre, post I and post II of group A, B and C:***

| | Pre treatment | Post I | Post II | p-value | | |
|---|---|---|---|---|---|---|
| | mean ± SD | mean ± SD | mean ± SD | Pre vs post I | Pre vs post II | Post I vs Post II |
| ***VAS*** | | | | | | |
| **Group A** | 7.8 ± 0.76 | 4.3 ± 0.73 | 2.9 ± 0.64 | 0.001 | 0.001 | 0.001 |
| **Group B** | 7.85 ± 0.67 | 5.25 ± 0.78 | 3.95 ± 0.68 | 0.001 | 0.001 | 0.001 |
| **Group C** | 8.25 ± 0.63 | 7 ± 0.79 | 5.8 ± 0.69 | 0.001 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **ODI (%)** | | | | | | |
| **Group A** | 72.1 ± 6.54 | 49.2 ± 6.84 | 34.1 ± 6.5 | 0.001 | 0.001 | 0.001 |
| **Group B** | 74.4± 6.63 | 57.5 ± 6.18 | 43.2 ± 5.96 | 0.001 | 0.001 | 0.001 |
| **Group C** | 73.35 ± 6.76 | 65.5 ± 6.95 | 57.5 ± 8.75 | 0.001 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **SLR (degrees)** | | | | | | |
| **Group A** | 33.75 ± 6.72 | 50.85 ± 6.45 | 76.55 ± 6.01 | 0.001 | 0.001 | 0.001 |
| **Group B** | 33.3 ± 5.69 | 45.65 ± 6.74 | 69.5 ± 7.27 | 0.001 | 0.001 | 0.001 |
| **Group C** | 34.6 ± 6.54 | 40.4 ± 6.54 | 53.1 ± 8.78 | 0.001 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |

**SD, Standard deviation**

**Between group comparison**

Between group comparison pre treatment revealed a nonsignificant difference in all parameters (p > 0.05).

There was a significant decrease in VAS and ODI of group A and B compared with that of group C (p < 0.001) and a significant decrease in group A compared with

that of group B at post I and post II ($p < 0.001$).

There was a significant increase in SLR of group A compared with that of group B and group C and a significant increase in SLR of group B compared with that of group C ($p < 0.05$) at post I and post II.

There was a significant increase in flexion ROM of group A compared with that of group B ($p < 0.05$). and group C ($p < 0.001$) and a significant increase in flexion of group B compared with that of group C ($p < 0.01$) at post I. At post II, there was a significant increase in flexion of group A and B compared with that of group C ($p < 0.001$) and a significant increase in group A compared with that of group B ($p < 0.001$).

There was a significant increase in extension ROM of group A compared with that of group B and group C at post I and post II ($p < 0.001$). There was no significant difference in extension ROM between group B and group C at post I ($p = 0.08$) while there was a significant increase in extension ROM of group B compared with that of group C at post II ($p < 0.001$).

There was a significant increase in right and left side bending ROM of group A compared with that of group B ($p < 0.05$). and group C ($p < 0.001$) and a significant increase in right side bending ROM of group B compared with that of group C ($p < 0.01$) at post I and post II.

There was a significant increase in right and left rotation ROM of group A compared with that of group C at post I and post II ($p < 0.001$). There was no significant difference in right ($p = 0.1$) and left rotation ($p = 0.06$) ROM between group B and group C at post I, while there was a significant increase in right and left rotation ROM of group B compared with that of group C at post II ($p < 0.01$). There was a significant increase in right and left rotation ROM of group A compared with that of group B at post I ($p < 0.05$) and a significant increase in right rotation of group A at post II ($p < 0.05$)while there was no significant difference in left rotation between group A and B at post II ($p = 0.19$). (Table 4)

**Table 4. Comparison of post treatment mean values of VAS, ODI and back ROM the three groups.**

| | **A vs B** | | **A vs C** | | **B vs C** | |
|---|---|---|---|---|---|---|
| | ***p*-value** | | ***p*-value** | | ***p*-value** | |
| | ***Post I*** | ***Post II*** | ***Post I*** | ***Post II*** | ***Post I*** | ***Post II*** |
| **VAS** | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| **ODI (%)** | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| **SLR (degrees)** | 0.04 | 0.01 | 0.001 | 0.001 | 0.04 | 0.001 |
| **Flexion** | 0.04 | 0.001 | 0.001 | 0.001 | 0.006 | 0.001 |
| **Extension** | 0.001 | 0.001 | 0.001 | 0.001 | 0.08 | 0.001 |
| **Right side bending** | 0.02 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 |
| **Left side bending** | 0.02 | 0.001 | 0.001 | 0.001 | 0.003 | 0.001 |
| **Right rotation** | 0.01 | 0.03 | 0.001 | 0.001 | 0.1 | 0.001 |
| **Left rotation** | 0.03 | 0.19 | 0.001 | 0.001 | 0.06 | 0.002 |

**Table 3.** ***Mean back ROM pre, post I and post II of group A, B and C:***

| ROM (degrees) | Pre treatment | Post I | Post II | p-value | | |
|---|---|---|---|---|---|---|
| | mean ± SD | mean ± SD | mean ± SD | Pre vs post I | Pre vs post II | Post I vs Post II |
| **Flexion** | | | | | | |
| **Group A** | 24.8 ± 5.17 | 38.4 ± 5.72 | 50.65 ± 3.7 | 0.001 | 0.001 | 0.001 |
| **Group B** | 24.35 ± 4.7 | 34.25 ± 5.02 | 44.3 ± 5.44 | 0.001 | 0.001 | 0.001 |
| **Group C** | 23.2 ± 4.06 | 29 ± 4.58 | 38.15 ± 3.77 | 0.001 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **Extension** | | | | | | |
| **Group A** | 6.5 ± 0.76 | 9.15 ± 1.03 | 11.3 ± 0.73 | 0.001 | 0.001 | 0.001 |
| **Group B** | 6.4 ± 0.59 | 7.95 ± 0.82 | 9.55 ± 0.68 | 0.001 | 0.001 | 0.001 |
| **Group C** | 6.7 ± 0.92 | 7.3 ± 0.86 | 8.45 ± 0.75 | 0.004 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **Right side bending** | | | | | | |
| **Group A** | 7.9 ± 0.64 | 13.35 ± 0.58 | 19.55 ± 1.14 | 0.001 | 0.001 | 0.001 |
| **Group B** | 7.95 ± 0.68 | 12.7 ± 0.73 | 17.55 ± 0.82 | 0.001 | 0.001 | 0.001 |
| **Group C** | 7.7 ± 0.57 | 11.9 ± 0.85 | 14.05 ± 1.71 | 0.004 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **Left side bending** | | | | | | |
| **Group A** | 6.9 ± 0.64 | 12.35 ± 0.58 | 18.55 ± 1.14 | 0.001 | 0.001 | 0.001 |
| **Group B** | 6.95 ± 0.68 | 11.7 ± 0.73 | 16.55 ± 0.82 | 0.001 | 0.001 | 0.001 |
| **Group C** | 6.85 ± 0.67 | 10.9 ± 0.85 | 13 ± 1.33 | 0.004 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **Right rotation** | | | | | | |
| **Group A** | 5.6 ± 0.59 | 7.55 ± 0.75 | 9.65 ± 0.49 | 0.001 | 0.001 | 0.001 |
| **Group B** | 5.65 ± 0.48 | 6.85 ± 0.74 | 9.1 ± 0.71 | 0.001 | 0.001 | 0.001 |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Group C** | 5.8 ± 0.61 | 6.35 ± 0.67 | 7.3 ± 0.73 | 0.004 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |
| **Left rotation** | | | | | | |
| **Group A** | 5.6 ± 0.59 | 7.7 ± 0.65 | 9.65 ± 0.48 | 0.001 | 0.001 | 0.001 |
| **Group B** | 5.8 ± 0.76 | 7.1 ± 0.71 | 9.2 ± 0.61 | 0.001 | 0.001 | 0.001 |
| **Group C** | 5.7 ± 0.65 | 6.55 ± 0.82 | 8.35 ± 1.03 | 0.004 | 0.001 | 0.001 |
| | ***p > 0.05*** | ***p < 0.001*** | ***p < 0.001*** | | | |

## DISCUSSION

The purpose of this study was to investigate the effect of high power and low power laser combined with core stability exercises on back pain, back disability, lumbar ROM, and angle of straight leg raising, in patients with acute and subacute LDH. Results showed that HPL and LPL are effective in treating patients with LDH; however, HPL is more effective than low power laser and placebo in treating patients with acute and subacute LDH.

Studies investigated the effect of HPLT on different low back problems (9) Showed that HPLT is effective in the treatment of patients with lumbar disc protrusion. HPLT can accelerate improvement in lumbar segment mobility and angle of SLR.

In addition to **Gocevska.,2019** (30) who found that using HPLT had good effects on back pain, disability, and improving ROM. Its beneficial effects lasted for three months. In the therapy of a patient with chronic LBP, it appears to be an effective, safe, and beneficial physical technique. Further, the analgesic impact of a high-power laser was demonstrated in patients with lumbar pain. It was discovered that patients who had high-power laser treatment experienced a considerable decline in pain and disability.

Moreover, the effects of HPLT, alone or in combination with other techniques were investigated. It was shown that in patients with Chronic LBP, HPLT paired with exercise appeared to be more helpful than either HPLT alone or placebo laser plus exercise (32)**.** High power laser therapy with lumbar school was compared to lumbar school alone. HPLT with lumbar school resulted in greater improvements in Oswestry and VAS rating (33). Moreover, when LASER was compared to pharmacological therapy, results showed that LASER had little biological activity and had few, side effects (33). These findings supported the current study finding as HPLT is a unique, powerful, and painless modality that has considerable pain-relieving effects. It exhibits photomechanical, photo thermal, and photochemical capabilities, as well as a variety of therapeutic benefits such as anti-edematous, analgesic, and biological stimulation (34)**.** HPLT clearly reduces pain levels in chronic and acute disorders, such as carpal tunnel syndrome, chronic osteoarthritis, and rheumatoid arthritis, shoulder tendinitis, knee injuries, fibromyalgia, and post-operative pain**. (34; (35; 36)**

**Ahmed et al., 2022** (37) When comparing low-level laser therapy for acute LBP with discogenic lumbar radiation to conventional treatment. It was revealed to be an effective adjunct therapy in dramatically improving local trunk motions, pain intensity, related functional impairment, and increasing SLR angle. In addition to A trial was done on patients with acute LBP with radiculopathy. Pain intensity, lumbar mobility, pain disability and quality of life was assessed. All of the outcomes were statistically significant, but the differences were larger in LPLT group. When

compared to the only pharmacologically treated group, the placebo group performed better. The findings of this study suggest that when LPLT is utilised as an additional therapy for acute LBP, the results are better (10)**.** This contradicts with the finding of (24) examined the effectiveness of LPLT in patients with acute and chronic LBP caused by LDH on pain and functional ability. There were no changes in pain severity or functional capability between laser and placebo laser treatments in patients with acute and chronic LDH.

This contradiction may be due to follow-up duration was short after three weeks only. There was no placebo group alone, In addition of the use of a therapeutic application like a hot pack.

Furthermore, in a meta-analysis on LPLT, it was found that LPLT was more successful than fake laser at reducing pain in the short-term and intermediate term. The strength and quantity of treatments, on the other hand, varied, and the pain reduction was minor in three investigations (including 102 persons) (1)**.** In addition to (3) conducted a randomized experiment to assess the effectiveness of LPLT in the treatment of chronic LBP patients. The treatment was assessed using VAS, lumbar ROM, and ODI. In the long term, LPLT paired with exercise is more effective than exercise alone.

Also, **Gur et al., 2003** Conducted a study to evaluate if LPLT is effective in the treatment of chronic LBP. In patients with chronic LBP, LPLT appears to be a successful technique for lowering pain, functional impairment and flexion mobility.

Literature compared the effects of HPLT and LPLT in patients LBP. **Abdelbasset et al.,2020** (11) compared the effect in nsLBP. Findings revealed that LPLT and HPLT have no difference effects on chronic nsLBP patients. LPLT and HPLT result in a significant improvement of ODI, VAS, lumbar ROM, and quality of life scores.

However, **Taradaj.,2018** (39) found that both high and low power laser therapy approaches were ineffective in patients with degenerative lumbar disc and did not show a significant effect over the placebo.

Both results of Abdelbasset and Taradaj contradicts with the current study findings. This contradiction could be explained by Firstly, the difference in type of patients recruited in each study, the two studies worked on chronic patients while in the current study we worked on acute and subacute patients. Secondly, Taragaj measured the long term effect of the treatment which could be a reason.

## Conclusion

High and low power laser are effective in treating patients with LDH; however HPL is more effective than LPL and placebo in treating patients with acute and subacute LDH.

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**تأثير الليزر عالى و منخفض القوة فى علاج فتق القرص القطنى الحاد و تحت الحاد**

**خلفية:** أحد الأسباب الأكثر شيوعًا لآلام أسفل الظهر هو فتق القرص القطني فهو يؤثر على جودة الحياة. أظهر الليزر منخفض وعالي الطاقة آثارًا كبيرة في تقليل الألم والعجز وتحسين نوعية الحياة لدى مرضى فتق القرص القطنى.
**الهدف:** دراسة لمقارنة فعالية الليزر عالي القوة والمنخفض والعلاج الوهمي جنبًا إلى جنب مع تمارين الثبات الأساسية على ألم وإعاقة الظهر ، ومدى الحركه (الثني ، والامتداد الخلفى ، والانحناء الجانبي ، والدوران) ، وزاوية رفع الساق المستقيمة ، في المرضى الذين يعانون من فتق القرص القطنى الحاد و تحت الحاد.
**الطريقة:** عينة تتكون من ستين مريضًا من الذكور والإناث الذين يعانون من انفتاق القرص القطنى الحاد (أقل من ٦ أسابيع) أو تحت الحاد (من ٦ أسابيع حتى ١٢ أسبوعًا) مع ألم في الساق تتراوح أعمارهم بين ٢٥-٤٥ عامًا. تم تقسيم المرضى بشكل عشوائي إلى ثلاث مجموعات متساوية (أ,ب,ج) يتلقون العلاج بالليزر عالي والمنخفض القوة والوهمي بالاضافة الى برنامج تمارين الثبات الأساسي ، على التوالي. تلقى جميع المرضى ١٢جلسة بواقع ٣جلسات أسبوعيا لمدة ٤ أسابيع. تم فحص الألم والإعاقة ونطاق الحركة وزاوية رفع الساق المستقيمة قبل وبعد ٦جلسات و بعد ١٢جلسة باستخدام مقياس تحديد الألم, مؤشر الإعاقة ,مدى حركه الظهر و وزاوية رفع الساق.
**النتائج:** أظهرت النتائج أن هناك انخفاضًا كبيرًا ذات دلالة احصائية في مقياس تحديد الألم, مؤشر الإعاقة و زياده فى مدى حركة الظهر وزاوية رفع الساق المستقيمة في المجموعات الثلاث. كان هناك انخفاض ذات دلالة احصائية في الالم والإعاقة لمجموعة الليزر عالية ومنخفضة القوة مقارنة بمجموعة الليزر الوهمي و انخفاض كبير في مجموعة الليزر عالية القوة مقارنة بمجموعة الليزر منخفضة القوة. كانت هناك زيادة ملحوظة في وزاوية رفع الساق المستقيمة لمجموعة الليزر عالية القوة مقارنةً بمجموعة الليزر منخفضة القوة ومجموعة الليزر الوهمي وزيادة ملحوظة في زاوية رفع الساق المستقيمة لمجموعة الليزر منخفضة القوة مقارنةً بمجموعة العلاج الوهمي. كانت هناك زيادة كبيرة ذات دلالة احصائية في مدى حركه الظهر لمجموعة الليزر عالية القوة مقارنة بمجموعة الليزر منخفضة القوة ومجموعة الليزر الوهمي.
**الاستنتاج:** الليزر عالي القوة أكثر فعالية من الليزر منخفض القوة والعلاج الوهمي في علاج المرضى الذين يعانون من فتق القرص القطنى الحاد و تحت الحاد. الليزر منخفض القوة أكثر فعالية من العلاج الوهمي في علاج المرضى الذين يعانون من فتق القرص القطني الحاد وتحت الحاد.
**الكلمات الداله:** فتق القرص القطنى ,الليزر عالى القوة ,الليزر منخفض القوة , تمارين الثبات الاساسى.