

# HIGH INTENSITY LASER THERAPY: A PAIN MANAGEMENT MODALITY FOR PATIENTS WITH CHRONIC LOW BACK PAIN

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## Background

### Introduction

Chronic low back pain (CLBP) is the most widespread type of musculoskeletal pain (1). Roughly 5% to 10% of low back pain (LBP) cases become chronic (2), creating difficulties for those affected (3).

High Intensity Laser Therapy (HILT) is used as treatment for musculoskeletal conditions (4). Studies have revealed HILT's positive outcomes on chronic pain (5–7). Research on HILT's efficacy in CLBP patients is not yet constituted.

Investigation of this topic would provide greater clarity for physiotherapists when choosing treatment options. Hence, the research question:

**What is the efficacy of High Intensity Laser Therapy in patients with CLBP in regards to pain?**

## Method

**Study design:** systematic literature review

### Data selection process

- Databases: MEDLINE, Cochrane Library, Academic Search Premier, CINAHL, and the literature search engine from Mendeley reference manager
- Key-words: "high intensity laser therapy", "chronic low back pain", "pain management" and their synonyms

Table 1. Inclusion/Exclusion criteria

Inclusion criteria:	Exclusion criteria:
<ul style="list-style-type: none"><li>Full text availability</li><li>Peer-reviewed articles/ e-journals</li><li>Randomized controlled trials (RCT), cohort, and case control studies</li><li>Laser therapy, containing HILT with class 3b-4 laser (8)</li></ul>	<ul style="list-style-type: none"><li>Articles published before 2009,</li><li>acute cases of lower back pain/injuries which subside within 12 weeks.</li></ul>
<ul style="list-style-type: none"><li><b>Methodological quality assessment:</b> performed by 2 researchers with the <b>Downs and Black checklist</b> (9). Results interpreted by Hooper et al. (10).</li><li><b>Data extraction:</b> <i>Study characteristics</i> retrieved, such as: (1) author; (2) year; (3) study design; (4) population; (5) laser type; (6) purpose of study. <i>Study outcomes</i> selected, such as: (1) the intervention; (2) follow up times; (3) outcome measurement tools; (4) results .</li><li><b>Best Evidence Synthesis (BES):</b> Conclusions were drawn using the scale from the Agency for Healthcare Research and Quality (11).</li></ul>	

## Results I

### Data selection procedure:

- Initial search result: n=107;
- Duplicates removed: n=18;
- Records excluded after screening title and abstract: n=71;
- Records excluded after screening full text: n=10;
- Records included in qualitative synthesis: n=8;
- Articles used for research: 1 clinical study (12), 6 randomized controlled trials (13–18), 1 controlled clinical trial (19).**

## Results II

Table 2. Data extraction and quality assessment

Author + year	Quality, design	Intervention	Outcome	Results
1. Chen 2018 (18)	24/28 - Good RCT	HILT + SDS	VAS	*improvement at 2 wk and 1 mo post-treat.
2. Radpay 2015 (13)	19/28 - Fair RCT	HILT	FPS	*improvement at 3 mo post-treat. compared to 1 mo
3. Alayat 2014 (15)	20/28 - Good RCT	HILT (+EX)	VAS	*improvement at 1 and 3 mo post-treat. with HILT combined /not combined with EX
4. Boyraz 2015 (12)	18/28 - Fair CS	HILT + EX	VAS BP SF-36	*improvement at 3 mo post-treat. compared to 1 mo post-treat.
5. Kolu 2018 (14)	18/28 - Fair RCT	HILT + HP + EX	VAS	*improvement at 1 month post-treat.
6. Taradaj 2018 (19)	17/28 - Fair CCT	HILT	VAS LQIP	*improvement at 3wk and 1 mo post-treat.
7. Choi 2017 (17)	20/28 - Good	HILT	VAS	*improvement at 1 mo post-treat.
8. Fiore 2011 (16)	15/28 - Fair	HILT	VAS	*improvement at 3 wk. post-treat.

**Abbreviations:** RCT=randomized controlled trial; \*= Statistically significant; HILT= high intensity laser therapy; SDS= spinal decompression system; VAS= visual analogue scale; BP SF-36= bodily pain score from Short Form questionnaire; CS=clinical study; CCT=controlled clinical trial; EX= exercise; HP= hot pack; wk=week; mo=month; treat.=treatment; FPS=faces pain scale; LQIP= Laitinen Questionnaire Indicators of Pain.

Table 3. Best Evidence Synthesis

Best Evidence Synthesis
❖ Limited evidence from one good RCT (16), one fair RCT (13), and one fair CCT (19), that HILT alone shows a statistically significant decrease of pain in post-treatment VAS, FPS, and LQIP scores.
❖ Limited evidence from one good RCT (15), one fair RCT (14), and one fair clinical study (12), that HILT combined with exercise produces a statistically significant decrease in post-treatment VAS score.
❖ Moderately strong evidence from two good RCTs (16,17) that HILT treatment results in greater significant decrease in VAS scores at three and four week post-intervention compared to ultrasound treatment.
❖ Weak evidence from two fair studies (12,13) that HILT is more effective long-term in decreasing pain levels portrayed through VAS (12) and FPS (13) scores at three months post-intervention, more so than at one month post-intervention.

**Abbreviations:** RCT=randomized controlled trial; CCT=controlled clinical trial; HILT= high intensity laser therapy; VAS= visual analogue scale; FPS=faces pain scale; LQIP= Laitinen Questionnaire Indicators of Pain .

## Discussion

### Interpretation

- ❖ Laser parameter setting correlates with success in decreasing inflammation (20,21), vasodilation initiation, and diminishing pain sensations (12,22).
- ❖ Difficulty in making distinction between statistical verses clinical significance (23): using common outcome tool may improve clinical relevance (24).
- ❖ Exercise and HILT combined may have distinct effect on CLBP (12,14,15,25-27).
- ❖ Findings on the subject of HILT versus ultrasound therapy efficacy vary (12,16,17,22).
- ❖ Current literature detects long-term improvements in pain scores up to six months in musculoskeletal disorders (5,28,29).

### Strengths

- First systematic review on this subject;
- Thorough method followed, changes described and substantiated;
- 4 databases investigated to avoid missing evidence, 8 articles incorporated for synthesis of review;
- Quality assessment performed by 2 researchers, increasing reliability of resultant scoring.

### Limitations

- **No interpretation of other measurement tools** which assess levels of disability (12,14-19), patient satisfaction (13), mental health (12), and physical functioning (12-15,17,18);
- **Laser parameters varied:** may limit generalizability outside of studies, reducing external validity;
- **Review conducted by amateur researcher:** may diminish internal validity, risk of reporting bias probable.

### Recommendations

- Therapists may combine HILT with exercise (12-14,25,26);
- Therapists may choose HILT over US in CLBP patients (16,17);
- Further exploration into HILT may increase its' future success and improve accessibility.

## Conclusion

This systematic review sought out to investigate the efficacy of HILT in CLBP patients in regards to pain. Results of the explored literature signify that HILT can be effective in decreasing pain levels in patients with CLBP, yet the degree of this efficacy is of limited evidence. Despite more studies needed to investigate HILT's efficacy independent of other treatment modalities in CLBP patients, this technology may be further accepted by physiotherapists and incorporated into clinical practice for the treatment of CLBP.

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### Bibliography

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