

Original Research Article

Clinical Effects of High - Power LASER and Joints Manipulation in Cervical Radiculopathy

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HIGHLIGHTS

- High-power LASER reduces inflammation and pain.
- Joint manipulation improves cervical spine mobility.
- Combined therapy enhances nerve function.
- LASER and manipulation alleviate radiculopathy symptoms.
- Effective non-surgical treatment for radiculopathy.

ABSTRACT

Background and History: The history of cervical radiculopathy is largely unknown. The most common causes of cervical radiculopathy are herniated discs and cervical spondylosis. The purpose of this review is to demonstrate the effects of high-power laser and joint manipulation on cervical radiculopathy. **Methodology** The search for the many relevant journals was carried out by referring to many databases: PubMed, PubMed Central (PMC), and Google Scholar. The main emphasis was given to RCTs and systemic reviews to examine the role of physiotherapeutic intervention on cervical radiculopathy survivors. **Discussion** Many research papers and articles were randomly studied while conducting this review, and conclusions were recorded based on these studies. **Conclusion** This study suggests that high-power laser therapy and joint manipulation both have a positive clinical effect on cervical radiculopathy. High-power laser therapy may help to reduce inflammation and promote tissue healing, while joint manipulation aims to improve joint mobility and reduce pain. No study has been found that shows the combined effect of HILT and joint manipulation, but there is one study that shows that both low-level laser therapy and the Mulligan manipulation technique have positive results. Cervical radiculopathy, a condition characterized by pain and neurological symptoms stemming from compression or irritation of nerve roots in the cervical spine, has been a topic of significant interest in the medical community. While its exact historical background remains largely obscure, its prevalence and impact on patients' lives have prompted extensive research into effective treatment modalities. The methodology employed in this review involved a comprehensive search of relevant literature using various databases such as PubMed, PubMed Central (PMC), and Google Scholar.

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INTRODUCTION

Cervical radiculopathy is a common neuromusculoskeletal disorder that causes pain and disability. Pain felt in the arm resulting from irritation of the cervical spinal nerves or their roots is referred to as radicular pain, or radiculopathy, and one person in a thousand has cervical radiculopathy[1].

Most commonly, neck pain, paraesthesia, and radicular pain are reported by patients with CR. Pain is an often myotomal, but sensory symptom usually appearing along a dermatome. When present, dermatome pain patterns are more common at the C4 level (60%), then C7 (34.2% of cases), and C6 levels (35% of cases). Scapular pain occurs in 51.6% of cases. A physical examination

usually finds reduced deep tendon reflexes and a painful range of motion (ROM) in the cervical spine. Though less than 2% of case show signs of muscle atrophy, decreased sensation is present in 1/3 of cases. C7 (39.3%–46.3%) and C6 (17.6%–42.6%) nerve roots are the most commonly affected nerve roots, respectively. Bilateral involvement is reported in 5–36% of cases[2].

The reported annual incidence of CR is 83.2/100,000 people (107.3 for men and 63.5 for women), while the reported prevalence is 3.5/1000 people. Individuals are most commonly affected in the 5th and 6th decades of life[3].

Cervical radiculopathy is a pathological process associated with co-

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mpression and inflammation of the cervical spinal nerves or nerve roots. The most common causes of cervical radiculopathy are herniated discs and cervical spondylosis [4]. Disc herniation is responsible for 21.9% of cervical radiculopathy patients. Cervical spondylosis refers to degenerative changes that occur with age in most adult populations. As we age, disc degeneration causes the disc height to decrease and the intervertebral foramen to narrow. As disc height decreases, stress on the vertebral bodies and facet joints increases. This cause's bone spurs formation and bone hypertrophy. Hypertrophy of the intervertebral joint and facet joints can cause foraminal stenosis and cervical radiculopathy[4]

Less commonly, cervical radiculopathy is caused by trauma, tumors, synovial cysts, meningeal cysts, and dural arteriovenous fistulae or tortuous vertebral arteries. It is mostly manifested by neck and arm pain, sensory loss, motor dysfunction, and changes in reflexes based on the dermatomal distribution.

Treatment of cervical radiculopathy is always managed through conservative therapies, such as oral analgesics, oral steroids, cervical traction, manual therapy, laser therapy, acupuncture, and various combinations of these. However, due to the quality of the evidence and adverse drug reactions,

reatments are subject to some limitations. For example, oral non-steroidal anti-inflammatory drugs are commonly used to ease acute pain. However, the use of long-term non-steroidal anti-inflammatory drugs may raise the risk of gastrointestinal ulcers, severe cardiovascular events, hypertension, acute renal failure, and the worsening of pre-existing heart failure.

In contemporary physiotherapy, high-power laser therapy is non-invasive, painless technique that can affect patients both locally and globally. Factors such as wavelength, irradiation mode (continuous or pulse), duration, time interval, energy fluence, power output, and irradiance are all factors that determine the impact of lasers on tissues[6].

Manual therapy, such as joint manipulation, is always used for patients with neck or without radicular symptoms. There is a low level of evidence that cervical manipulation and mobilization as unimodal interventions are effective on pain and range of motion at the immediate follow-up, but there is no evidence that they are effective as unimodal interventions in general[3].

Aim of study:

The aim of this study is to compare the effects of high-intensity laser therapy (HILT) and joint manipulation on pain, range of motion (ROM), and functional activity on cervical pain associated with cervical disc herniation (CDH).

Table-01

	Inclusion	Exclusion
Study year	2013 -2023	Before 2013
Study design	Rcts, systemic review, original paper	Manuscript, ROL, desartation, non Rcts, case series, case report
Settings	Hospitals, clinics, IPD, OPD	Camp, NGOs
Context	HILT, joint manipulation, exercise therapy, NDM, TENS, IFT	NSAIDs, opioids, surgical approach,
Outcome measures	VAS, Neck Disability Index, CROM device, hand grip dynamometer	Barthel index, MMT

The search for the many relevant journals was carried out by referring to many databases: PubMed, PubMed Central (PMC), and Google Scholar. The main emphasis was given to RCTs and systemic reviews to examine the role of physiotherapeutic intervention on cervical radiculopathy survivors.

Data extraction and analysis:

Four reviewers independently omlpleted data extract and review

the information extracted were on following study characteristics-

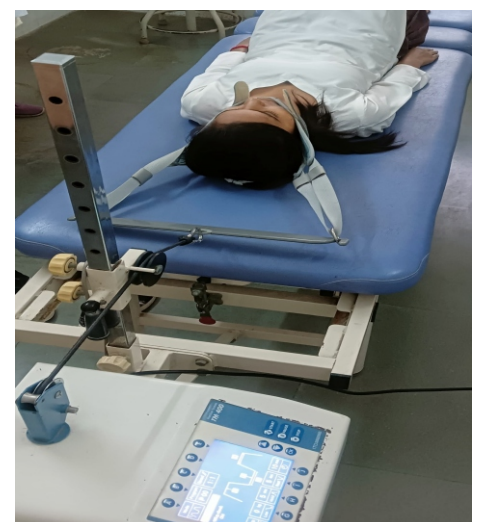
- 1- Research aim
- 2- Exercise therapy, manual therapy, joint manipulation and electrotherapy are used in cervical radiculopathy
- 3- No of subjects includes
- 4- Result

Table-02

Sr. no.	Characteristics	Author	Year	Country	No of subjects involved	Types of research	Conclusion
1.	Efficacy of high-intensity laser treatment in individuals with neck pain - a systematic review and meta-analysis	Yu-hau-xie et.al ⁷	2023	China	Total no-60 Gr A-20(NDM, IR,IFT) Gr B-20 (HILT,IRR,IFT) GrC-20(HILT,NDM,IR,IFT)	Systematic review and meta-analysis	The result of Gr B and Gr C had more significant than Gr A
2.	Clinical efficacy of high-intensity laser treatment in patients with cervical radiculopathy: a 12-week randomized, placebo-controlled follow-up study	Songul inc et. al ⁸	2023	Turkey	Total no- 90 Gr1 (HILT+EX) = 30 Gr2(PL+EX)=30 Gr3(EX)=30	RCTs	The treatment of Gr1 is more effective to treating the cervical radiculopathy.
3.	Multidisciplinary intervention of high-intensity laser with neurodynamic mobilization for cervical radiculopathy	NAWAL ABD EL-RAOUF ABU SHADY et. al ⁹	2020	Egypt	Total no -60 GrA-20 Median nerve neurodynamic mobilization Gr B-HILT Gr C-Multimodal intervention median nerve NDM + HILT	Pre and Post experimental RCT	The multimodal intervention program had more effects in decreasing pain, neck disability, increasing hand grip strength, and CROM in cervical radiculopathy.
4.	Shi-style cervical manipulation for cervical radiculopathy	Xue- jun cui et. al ¹⁰	2017	China	Total no-360 Excluded – 01(withdrew of consent) Gr A – 179 (Shi- style manipulation) GrB-180(Mechanical cervical traction)	A multicentre randomized controlled clinical trial	SCM is more effective treatment option than MCM for treatment of cervical radiculopathy
5	Comparison of high-intensity laser therapy, ultrasound therapy, and transcutaneous nerve stimulation for neck pain associated with intervertebral disc herniation	Mstafa yilmaz et. al ¹¹	2020		Total no -40 Gr1-20(HILT + exercise) Gr2-20(US+TENS + exercise) (total treatment session in 5 day a week)	A randomized trial	There is no major difference between both groups. Both groups are found to be effective in reducing pain and improving quality of life.

6.	Does cervical spine manipulation reduce pain in patients with cervical degenerative radiculopathy? A systematic review and meta-analysis of the evidence	Liguo zhu et. al ¹²	2015	China	Total no – 502 three trial conducted. First trial (2005)-n-213, Gr1- (treatment Gr)-cervical rotational manipulation, 2time/week, Gr2- (Control Gr)-cervical computer traction, 20 min 3time/week second trial (2009)-n-210, Gr1- (treatment Gr)-cervical rotation-traction manipulation, 1 every day other day, Gr2- (Control Gr)-cervical computer traction, 30 min 7time/week Third trial (2012)-n-79 Gr1- (treatment Gr)-cervical fix-point traction manipulation once every other day, Gr2- (Control Gr)-cervical computer traction, 30 min daily, 7time/week	Systematic review and meta-analysis	There is more effectiveness of spine manipulation in treating people with cervical radiculopathy compared with computer traction.
7.	Immediate and short-time period results of thoracic spinal manipulation in sufferers with cervical radiculopathy - a randomized managed trial.	Ian A. young et. al ¹³	2019	Virgini	Total no- 90 Gr1 (HILT+EX) = 30 Gr2(PL+EX)=30 Gr3(EX)=30	A Randomized Controlled Trial	In this study, 1 session of thoracic manipulation to patients with cervical radiculopathy resulted in improved pain, disability, cervical ROM, and deep neck flexor endurance compared to that patient treated with sham manipulation.
8.	Effect of snag mulligan method compared with low-level laser treatment in patients with unilateral cervical radiculopathy	Ghada A. abdallah et. al ¹⁴	2017	Egypt	Total no- 50 Gr A- SNAGs Mulligan manipulation Technique + conventional program. Gr B - low level laser Therapy + conventional program (three sessions per week for four week)	Pre and Post experimental RCT	This study conclude that both low level laser therapy and Mulligan manipulation Techniques have shown positive result.

9.	Comparison of the effects of a combination of high-power laser and manual therapy and manual therapy alone on muscle activity in patients with chronic cervical radiculopathy	Hassan namvar et. al ¹⁵	2023	Iran	Total no- 42 Gr A- 20 HILT+ manual therapy Gr B – 22 Manual therapy (sub occipital muscles group release, ULTT for median nerve and radial nerve chin tuck exercise and resistance and stretching exercise (treatment given 3 times per week for 6 week)	RCT (review article)	High power laser therapy with manual therapy can significantly reduce pain, improve function and muscles activity in cervical radiculopathy patients.
10	Cervical mobilization and thoracic spine manipulation in sufferers with unilateral cervical radiculopathy C6 and C7 - a comparative examine	Gopal nambi et. al ¹⁶	2013	India	Total no- 45 Gr A- 15(cervical mobilization technique) Gr B- 15(thoracic spine manipulation technique) Gr C- 15 (Intermittent Cervical Traction and Strengthening Exercise) Treatment given for 4 weeks	RCTs	Group B treatment is more effective than other treatment (Gr A and Gr C) to reducing pain, improving hand grip strength and functional status



Abbreviation

- HILT-High intensity laser therapy
- IFT- Interferential therapy
- NDM- Neurodynamic mobilization
- IRR- Infra-red radiations
- PL- Placebo
- TENS- Transcutaneous electrical nerve stimulation
- ULTT- Upper limb tension test
- US- Ultrasound
- VAS- visual analogue scale
- NDI- neck disability index

DISCUSSION

Many studies have investigated the effects of high-power laser

therapy and joint manipulation therapy in cervical radiculopathy, while both approaches have shown significant results in reducing pain and improving ROM and quality of life (QOL).

Yu-Hua Xie, Man-Xia Liaoa, Freddy M.H. Lamc, et. al (2023) describe the effectiveness of high-intensity laser therapy in an individual with neck pain. After treatment, he found that there was improved hand grip strength, an increased range of motion, and a decrease in VAS and NDI scores in all three groups, but groups B and C showed a more significant result than group A.

Ince, S., Eyvaz, N., DüNDAR, Ü., Toktaş, H., Yeşil, H., et al. (2023) evaluate the clinical efficiency of high-intensity laser therapy in patients with cervical radiculopathy author proved that laser therapy and exercise are more effective in improving radicular pain, quality of life, and functional movement in patients with cervical radiculopathy.

Nawal Abdel Raouf Abu Shady, Hazem Mohammed Negm, and Zizy Mostafa Youssef Zitou et.al (2020) describe the study of a multimodal intervention of high-intensity laser with neurodynamic mobilization in cervical radiculopathy. There is a randomized control trial. After treatment, he found significantly decreased VAS and NDI and improved hand grip strength.

Cui, X. J., Yao, M., Ye, X. L. et.al (2017) evaluate the study of Shi-style cervical manipulation for cervical radiculopathy. After two weeks of treatment, the author said that the Shi-style cervical manipulation showed a greater improvement than mechanical cervical traction in patients with cervical radiculopathy.

Mustafa Yilmaz, Devrim Tarakci, Ela Tarakci, et.al (2020) describe the study of a Comparison of high-intensity laser therapy, ultrasound therapy, and transcutaneous nerve stimulation for neck pain associated with intervertebral disc herniation. According to the author, there was no major difference between both groups. Both groups are found to be effective in reducing pain and improving quality of life.

Zhu, L., Wei, X., & Wang, S. et.al (2015) evaluate the study. Does cervical spine manipulation reduce pain in patients with cervical degenerative radiculopathy? There was more effectiveness of spine manipulation in treating people with cervical radiculopathy than computer traction.

Ian A. Young, Federico Pozi, James Dunning, et.al (2019) evaluate the immediate and short-term effects of thoracic spine manipulation in patients with cervical radiculopathy. In this study, thoracic manipulation of patients with cervical radiculopathy resulted in reduced pain, disability, increased cervical ROM, and deep neck flexor endurance compared to those patients treated with sham manipulation.

Ghada A. Abdallah, Rabab A. Mohamed, Moussa A. Sharaf, et.al (2017) Effect of snag mulligan method compared with low-level laser treatment in patients with unilateral cervical radiculopathy. The author concludes that both low-level laser therapy and Mulligan manipulation techniques have shown positive results.

Hassan Namvar, Saimak Bashardoust Tajali, Gholamreza Olyaie, et.al (2023) evaluate the effect of high-power laser plus manual therapy versus manual therapy alone on muscle activity in patients with chronic cervical radiculopathy. After treatment, the author found that high-power laser therapy with manual therapy can significantly reduce pain and improve function and muscle activity in patients with cervical radiculopathy.

Dr. Gopal Nambi S., Pooja K. Vora, Manisha Jhang et.al (2013) describe cervical spine mobilization versus thoracic spine manipulation in subjects with unilateral C6 and C7 cervical radiculopathy: a comparative study. After treatment, the author found that thoracic spine manipulation was more effective than the cervical mobilization technique and intermittent cervical traction and strengthening exercises.

CONCLUSION

This study suggests that high-power laser therapy and joint manipulation both have a positive clinical effect on cervical radiculopathy. High-power laser therapy may help to reduce inflammation and promote tissue healing, while joint manipulat-

-tion aims to improve joint mobility and reduce pain. No study has been found that shows the combined effect of HILT and joint manipulation, but there is one study that shows that both low-level laser therapy and the Mulligan manipulation technique have positive results.

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