



EFFECTIVENESS OF LASER THERAPY WITH MCKENZIE EXERCISES ON PAIN, RANGE OF MOTION AND FUNCTIONAL ACTIVITIES IN SUBJECTS WITH MECHANICAL NECK PAIN AMONG PHYSIOTHERAPY STUDENTS.

Physiotherapy

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ABSTRACT

Background and Purpose: Mechanical Neck Pain (MNP) is predominantly localized to the posterior region of the neck and can be intensified by movements of the neck or prolonged maintenance of poor postures. **Objectives:** The study is to find out the effectiveness of laser therapy with mckenzie exercises on pain, range of motion and functional activities in subjects with mechanical neck pain among physiotherapy students. **Methodology:** The study design is an experimental based which consists of 30 subjects, were randomised into single group. All the subjects were treated laser therapy with mckenzie exercises for 6 weeks. Pre and post values are taken before and after the treatment. **Outcome Measures:** Pain was measured by numerical pain rating scale, range of motion measured by goniometer and functional activities by neck disability index. **Results:** After the data analysis, the results revealed significant improvement $\{p < 0.05\}$ in pain, range of motion and functional activities. **Conclusion:** Laser therapy with mckenzie exercises are more effective in reducing pain, range of motion and functional activities in subjects with mechanical neck pain among physiotherapy students.

KEYWORDS

Mechanical neck pain, Laser therapy, Mckenzie exercises.

INTRODUCTION

Neck pain is a common musculoskeletal problem, often leads to discomfort and stiffness in the cervical region.^[1] According to the Global Burden of Disease study, which assessed 291 different conditions, neck pain emerged as the 21st most significant concern in terms of overall impact and the fourth most considerable contributor to disability.^[2]

Mechanical neck pain (MNP), often termed as 'non-specific neck pain,' is a frequently encountered condition linked to the positioning of the head and neck.^[3]

Kanlayanaphotporn and colleagues provided the following definition of Mechanical Neck Pain (MNP): 'Pain that is predominantly localized to the posterior region of the neck and can be intensified by movements of the neck or prolonged maintenance of specific postures.'^[4]

The Global Burden of Disease Study reveals the rising prevalence of neck pain, with a 21% increase in the population experiencing pain lasting more than three months between 2006 and 2016.^[5] The occurrence of neck pain is notably elevated among college students, with a prevalence ranging from 48% to 78%.^[6]

However, physiotherapy students often entails extended hours of strenuous activities and maintaining static postures, which may have adverse effects, potentially resulting in discomfort, pain, and physiological changes, especially in the back, neck, or shoulders. If this recurring discomfort is disregarded, it can accumulate and lead to injuries.^[7]

Several studies have drawn attention that referred pain triggered by active Trigger Points within the suboccipitals, upper trapezius, levator scapulae, and sternocleidomastoid muscles could play a role in the symptoms experienced by individuals with mechanical neck pain. Among these muscles, the upper trapezius is often identified as the most frequently implicated source of discomfort.^[8]

Physical therapist may include passive treatment such as massage, interferential therapy or heat application and active treatment such as exercises therapies includes traction for spinal pressure relief, electrotherapy and exercises aimed at enhancing cervical muscle strength and stability.

The term "Laser" is derived from "light amplification by stimulated

emission of radiation," representing a form of photonic therapy characterized by features such as collimation, convergence and monochromaticity.

Low-Level Laser Therapy (LLLT) is used for reducing pain, inflammation, edema, swelling, and tissue recovery. The application of LLLT is thought to restrict the release of inflammatory agents like bradykinin and histamine, thereby reducing the inflammatory response. However, it is strongly postulated that the primary anti-inflammatory effect of laser stimulation is the reduction in prostaglandin activity during the inflammatory process. Prostaglandins contribute to vasodilation at the inflammation site, facilitating the infiltration of inflammatory cells into the surrounding tissue and this can enhance the healing process.^[9]

The McKenzie method was introduced in Sweden in 1985 and came to be frequently used in the 1990 which promotes self-care treatment by emphasizing repetitive exercises with a focus on extension. This approach includes range of motion exercises, manipulation, and patient education.^[10]

MATERIALS & METHODOLOGY

- **Sample Collection** - subjects were students recruited from College of physiotherapy.
- **Study Design:** Experimental design. Ethical clearance was obtained from institutional ethics committee of Sri Venkateswara Institute of Medical Sciences, Tirupati (IEC NO. 1539).
- **Study Setting:** College of physiotherapy, SVIMS.
- **Study Duration** : 6 weeks
- **Sample Technique** : simple random sampling
- **Sample Size:** A total of 30 samples were taken.

Inclusion Criteria

1. Subjects with neck pain
2. Subjects between the age group : 20-30 years. Both males and females were included.
3. Students who are willing to participate.
4. Triggers with positive jump sign

Exclusion Criteria

1. Skin infections
2. Cardiac conditions
3. History of blood disorder
4. Severe trauma such as fracture or dislocation

5. Cervical surgeries

Outcome Measures

- Numerical pain rating scale(NPRS)
- Universal Goniometer
- Neck disability index(NDI)

PROCEDURE

All the 30 subjects are screened on basis of inclusion and exclusion criteria and were randomised by simple random sampling method in one group. Subjects were treated with laser therapy and mckenzie exercises for 6 weeks. Pre and post values are taken before and after the treatment.

Laser Therapy

Patient was positioned in prone lying or sitting with well supported in the position of maximum comfort. The affected part treated to be exposed and remaining part was covered. During the treatment both physical therapist as well as patient should wear the protective goggles.

Dosage Parameters

- Wavelength 650nm with visible red rays
- Dosage: 15.0 j/sq.cm
- Method – scanning
- Treatment duration 12 min



Figure 1: Application of Laser

Mckenzie Exercises

The exercises performed 2 sets per day, each set had 8-10 repetitions with holding time for 5 seconds each position.

- Neck Retraction
- Neck Retraction and Extension
- Retraction and Rotation
- Retraction and Lateral Flexion
- Retraction in supine position

Treatment Sessions: 4 sessions of treatment for a week was given for a period of 6 weeks.

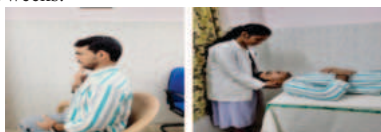


Figure 2: Mckenzie Exercises

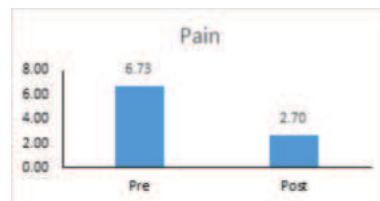
Data Analysis

The statistical analysis was done by using the software SPSS statistics 25.0 version, the analysis was conducted to meet the objectives framed under the study. Descriptive statistics was performed to find out the mean, standard deviation for demographic variables and outcome variables. $P \leq 0.05$ then there is statistical significance difference between the pre and post.

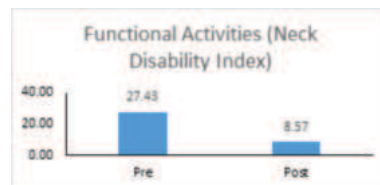
Table-1 : Pre and Post Mean For the Variables

Variable	N	Mean	SD	Z-test	p-value
Pain Pre	30	6.73	1.048	-4.856	0.000
Pain Post	30	2.70	0.915		
Flexion Pre	30	37.50	3.411	-4.973	0.000
Flexion Post	30	42.50	3.149		
Extension Pre	30	50.33	4.901	-4.886	0.000
Extension Post	30	60.67	4.498		
Lateral Flexion Right Pre	30	36.50	3.749	-4.804	0.000
Lateral Flexion Right Post	30	42.50	3.655		
Lateral Flexion Left Pre	30	37.00	3.373	-4.807	0.000
Lateral Flexion Left Post	30	42.83	3.130		

Rotation Right Pre	30	57.67	5.371	-4.832	0.000
Rotation Right Post	30	69.83	4.997		
Rotation Left Pre	30	57.00	5.186	-4.843	0.000
Rotation Left Post	30	69.17	4.564		
Functional Activities (Neck Disability Index) Pre	30	27.43	3.170	-4.796	0.000
Functional Activities (Neck Disability Index) Post	30	8.57	3.812		



Graph 1 – Mean Values of Pain



Graph 2 – Mean Values of Functional Activities

RESULT

Wilcoxon Signed Ranks Test is used to compare the change within the group of all variables. There is significant difference between pre and post of all variables with p value < 0.05 which means the therapeutic intervention shows a significant improvement in reducing the neck pain, range of motion and functional activities.

DISCUSSION

The aim of the present study is to know the effectiveness of laser therapy with mckenzie exercises on pain, range of motion and functional activities in subjects with mechanical neck pain among physiotherapy students.

All the 30 subjects are screened on basis of inclusion and exclusion criteria and were randomised by simple random sampling method into single experimental group. Subjects were treated with laser therapy and mckenzie exercises for 6 weeks. Pre and post values are taken before and after the treatment.

The results of the current study shows that, there is a significant improvement in pain, range of motion and neck disability with the pre and post treatment.

Howard B Cotler et.al stated that Low Level Laser Therapy (LLLT) is beneficial for pain relief and can accelerate the body's ability to heal itself. LLLT has a long history and strong basic science evidence, which supports its use in neck pain management. It has been observed in many studies, that lower doses are more effective than much higher doses. These low doses of light have demonstrated the ability to heal skin, nerves, tendons, cartilage and bones.^[11]

According to Gorel Kjellman et al.,^[12] performed a study on neck pain by providing treatment with McKenzie exercise, conventional exercises, and ultrasound. They found that the McKenzie treatment was more favorable than general exercise and control group and had rapid improvement in pain intensity during the first three weeks.

Evidence from the previous studies and present study suggests that the laser therapy with mckenzie exercises are effective in improving pain, range of motion and functional activities in students with mechanical neck pain.

CONCLUSION

According to the present results, the study concluded that the laser therapy along with mckenzie exercises are effective in reducing pain, improving range of motion and functional activities in students with mechanical neck pain.

REFERENCES

1. Gharib N, Hamid NSJJAS. Prevalence of Mechanical Neck Pain in Taif University Female Students: A Survey Study. 2013;9(6).
2. Hoy D, March L, Woolf A, Blyth F, Brooks P, Smith E, et al. The global burden of neck pain: estimates from the global burden of disease 2010 study. *Ann Rheum Dis*. 2014;73:1309–1315.
3. Dennison BS, Leal MH. Mechanical neck pain. In: Fernandez Penas C, Cleland J, Dommerholt J, eds. *Manual therapy for musculoskeletal pain syndromes: an evidence-and clinical-informed approach*. Elsevier, 2016: 95–107.
4. Kanlayanaphotporn R, Chiradejnant A, Vachalathiti R. The immediate effects of mobilization technique on pain and range of motion in patients presenting with unilateral neck pain: a randomized controlled trial. *Arch Phys Med Rehabil* 2009;90:187–92.
5. GBD 2016 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 328 diseases and injuries for 195 countries, 1990–2016: a systematic analysis for the global burden of disease study 2016. *Lancet*. 2017;390(10100):1211–59.
6. Hurwitz EL, Randhawa K, Yu H, Cote P, Haldeman S. The global spine care initiative: a summary of the global burden of low back and neck pain studies. *Eur Spine J*. 2018;27(Suppl 6):796–801.
7. Iqbal Z, Alghadir A. Prevalence of work related musculoskeletal disorders among physical therapists. *Med Pr*. 2015 Jan 1;66(4):459-69.
8. Fernández-de-las-Peñas C, Alonso-Blanco C, Miangolarra JC. Myofascial trigger points in subjects presenting with mechanical neck pain: a blinded, controlled study. *Man Ther*. 2007;12:29-33. <http://dx.doi.org/10.1016/j.math.2006.02.002>
9. Maeda T. Morphological demonstration of low reactive laser therapeutic pain attenuation effect of the Gallium Aluminium Arsenide diode laser. *Pain* 1988; 72: 25-30.
10. McKenzie RA: Treat your own neck. Lower Hutt: Spinal Publication, 1983. [Google Scholar].
11. Cotler et al. The Use of Low Level Laser Therapy (LLLT) For Musculoskeletal Pain. *MOJ Orthop Rheumatol*. Author manuscript; available in PMC 2016 June 09. *MOJ Orthop Rheumatol*. 2015 ; 2(5): . doi:10.15406/mojor.2015.02.00068.
12. MillerJ, Gross A, D'Sylva J, Burnie SJ, Goldsmith CH, Graham N, et al. Manual therapy and exercise for neck pain: A systematic review. *Man Ther* 2010;15:334-54.