

## Response of Neck Pain to Handling the Trigger Points and Classical Acupoints by Low Level Laser Therapy and Phonophoresis

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### KEYWORDS

Low level laser  
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classical  
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algometer and  
inclinometer.

### ABSTRACT

**Background:** A common musculoskeletal ailment, neck discomfort is marked by regional neck pain and, in certain situations, radiating pain.

**Purpose of the study:** The purpose of this study was to evaluate the effects of low-level laser treatment (LLLT) and phonophoresis on the myofacial trigger points and classical acupoints of the upper trapezius muscle.

**Materials and Methods:** There were 120 volunteers with neck discomfort of both sexes. Their ages ranged from twenty to forty. At random, they were split up into eight equal groups: While the other four groups received treatment on myofacial trigger points of the upper trapezius muscle, four groups received treatment on conventional acupoints. The CROM gadget measures cervical range of motion, and the pressure algometer measures the level of discomfort.

**Results:** Cervical range of motion and pain intensity increased significantly after treatment compared to before treatment within groups, according to a 3×2 Mixed design MANOVA (P=0.0001; P<0.05). Following treatment, the combined phonophoresis and laser group experienced a significant increase in cervical range of motion compared to the phonophoresis and laser groups alone. This was also the case for pain intensity in both the myofascial trigger point and classical acupoint groups.

**Conclusion:** According to the study's findings, all groups experienced an improvement in cervical range of motion and a reduction in pain intensity; however, the phonophoresis and LLLT group experienced greater gains than the other groups. When it comes to lowering pain and increasing CROM classical acupoints and myofascial trigger points, LLLT and phonophoresis work better together than any treatment alone.

## **Introduction**

Heart, kidney, liver, small and large intestines, lung, bladder, pericardium, stomach, and spleen are among the body components that are represented by the 360 traditional acupoints, sometimes referred to as meridians. The four acupoints on the afflicted side will be Shousanli (Large Intestine Meridians, LI 10), Hegu (Large Intestine Meridians, LI 4), Waiguan (Sanjiao Meridians, TE 5), and Houxi (Small Intestine Meridians, SI 3). These acupoints are commonly used to treat cervical myofascial pain syndrome (MPS) [1-3].

Phonophoresis for traditional acupoints and trigger points: Phonophoresis (PH) is the application of ultrasound to improve topical medication absorption and deep tissue penetration. Numerous factors, such as the rate, depth of skin penetration, degree of drug penetration, and potential adverse tissue effects, influence the therapeutic benefits of drugs given topically. Low Level Laser for Trigger Points and Classical Acupoints: Among the different techniques of application in Low Level Laser Therapy (LLLT), there are some very promising "trigger points" (TPs), or myofascial zones of particular sensibility and of highest projection of focal pain points, due to ischaemic conditions (He Ne 632.8 nm visible red or infrared 820-830 nm continuous wave and 904 nm pulsed emission). After treating over 200 patients clinically (including those with skeletal muscle disorders, myogenic neck pain, shoulder and arm pain, epicondylitis humeri, tenosynovitis, cervical and radicular pain, and headaches and facial pain, for whom the "trigger points" were better than we ever imagined), the effects of LLLT and the results surpassed our expectations [3-10].

## **Materials and Instruments**

### **A-Measurement Equipment:**

Cervical range of motion (CROM inclinometer Device):used to measure cervical range of motion including rotation to the right and left, side bending right and left, flexion and extension as cleared in figure1 (a, b, c and d respectively).

### **Pressure Algometer:**

The algometer is a piece of apparatus that measures how sensitive a person is to pain. With putting pressure on the determined trigger point up to patient tolerable limit of pain threshold reading was taken as illustrated in figure2 (a and b).

**B-Therapeutic equipment:** Chinesport diode laser machine and chinesport ultrasonic device figure 3 and

**figure 4.**



(a)



(d)



(b)



(b)

**Figure 1:** represents cervical range of motion measurement by using inclinometer. (a) rotation, (b) sidebending, (c) flexion and (d) extension.



(a)



(b)

**Figure 2:** (a) pressure algometer device and (b) pain threshold measurement by pressure algometer

**Figure 3:** Low Level Laser device (Chinesport)



**Figure 4:** Ultrasound device (Chinesport)

**METHODOLOGY** One hundred and twenty individuals, both male and female, reported having neck pain. They are between the ages of 20 and 40. Eight equal groups were divided at random. Pain threshold determined by Algometer machine and Crom inclinometer gadget identify cervical scope of mobility. While the other four groups worked on myofascial trigger points in the upper trapezius muscle figure 5, the first four groups were treated at classical acupoints figure 6. . For the first group, which included 15 volunteers of both sexes with neck pain, phonophoresis of 1% hydrocortisone and 1% diclofenac on classical acupoints was administered for four weeks, with three treatments each week. The second group, which included 15 volunteers of both sexes with neck pain, received 1% hydrocortisone phonophoresis in addition to 5% diclofenac on traditional acupoints. For four weeks, they attended three sessions a week. In the third group, which included 15 volunteers with neck pain of both sexes, LLL was applied to traditional acupoints. They went to three sessions a week for up to

four weeks. In the fourth group, which included 15 volunteers with neck pain of both sexes, LLLT and phonophoresis were applied to classical acupoints. For a maximum of four weeks, they attended three sessions per week. The fifth group, which included 15 volunteers of both sexes with neck pain, received phonophoresis with 1% hydrocortisone and 1% diclofenac on myofascial trigger sites in the upper trapezius muscle. For a maximum of four weeks, they attended three sessions per week. The sixth group, which included 15 volunteers of both sexes with neck pain, received 1% hydrocortisone

phonophoresis in addition to 5% diclofenac on myofascial trigger sites in the upper trapezius muscle. For a maximum of four weeks, they attended three sessions per week. LLL was used to treat myofascial trigger points in the upper trapezius muscle in the seventh group, which included 15 volunteers with neck pain of both sexes. For a maximum of four weeks, they attended three sessions per week. Phonophoresis and LLLT on myofascial trigger sites in the upper trapezius muscle were used to treat the eighth group, which included 15 volunteers with neck pain who were both male and female. For a maximum of four weeks, they attended three sessions per week.



**Figure 5:** Application of low level laser on myofascial trigger point



**Figure 6:** Application of low level laser on classical acupoint

## RESULTS and DISCUSSION

A total of 120 patients took part in the trial, and they were split up into 8 groups at random (15 patients each group). There are four groups for myofascial trigger points and four groups for classical acupoints (A, B, C, and D). There was no discernible age difference between groups A, B, C, and D ( $P=0.275$ ;  $P>0.05$ ). Group A received laser therapy, Group B received hydrocortisone 1%+diclofenac 1% laser and phonophoresis, Group C received hydrocortisone 1%+diclofenac 5% laser and phonophoresis, and Group D received a combination of laser and phonophoresis.

Classical acupoints: Group A ( $P=0.973$ ), Group B ( $P=0.514$ ), Group C ( $P=0.391$ ), and Group D ( $P=0.070$ ) all showed non-significantly ( $P>0.05$ ) increased right rotation at post-treatment compared to pre-treatment, according to multiple pairwise comparison tests (time effect) for CROM variables.

The left rotation significantly ( $P<0.05$ ) increased within group D ( $P=0.026$ ) at post-treatment compared to pre-treatment, but there were non-significantly ( $P>0.05$ ) increased in left rotation at post-treatment within group A ( $P=1.000$ ), group B ( $P=0.574$ ), and group C ( $P=0.117$ ). At post-treatment compared to pre-treatment, right and left side bending were significantly ( $P<0.05$ ) higher in group D ( $P=0.008$  and  $P=0.036$ , respectively), but non-significantly ( $P>0.05$ ) higher in groups A ( $P=0.688$  and  $P=0.826$ , respectively), B ( $P=0.369$  and  $P=0.635$ , respectively), and C ( $P=0.372$  and  $P=0.488$ , respectively).

Group D, which underwent combined laser and phonophoresis treatment, benefited from these substantial and non-significant variations in CROM at post-treatment as a result of the time effect. Additionally, patients in Group D who received both phonophoresis and laser treatment showed higher improvements in right rotation, left rotation, right side bending, and left side bending (5.53, 6.52, 11.65, and 11.21%, respectively). These patients were followed by patients in Group C (2.65, 4.48, 4.15, and 3.86%, respectively) who received laser treatment alone, patients in Group B (1.90, 1.52, 3.45, and 2.53%, respectively) who received phonophoresis

hydrocortisone + 5% diclofenac, and finally, patients in Group A (0.10, 0.00, 1.73, and 1.12%, respectively) who received phonophoresis hydrocortisone + 1% diclofenac.

Group A, B, C, and D for classical acupoints did not differ significantly ( $P>0.05$ ) in right rotation ( $P=0.054$ ), left rotation ( $P=0.057$ ), right side bending ( $P=0.054$ ), or left side bending ( $P=0.395$ ) at pre-treatment, according to multiple pairwise comparison tests (group effect) for CROM variables (Table 1). Additionally, at post-treatment, there were no significant changes ( $P>0.05$ ) in left rotation ( $P=0.138$ ), right rotation ( $P=0.092$ ), or left side bending ( $P=0.100$ ) across the four groups. However, following treatment, groups A, B, C, and D showed a significant difference ( $P<0.05$ ) in right side bending ( $P=0.004$ ).

There were non-significantly ( $P>0.05$ ) higher levels of Trp1, Trp2, and Trp3 at post-treatment compared to pre-treatment in groups A ( $P=0.874$ ,  $P=0.524$ , and  $P=0.734$ , respectively), B ( $P=0.484$ ,  $P=0.340$ , and  $P=0.440$ , respectively), C ( $P=0.154$ ,  $P=0.373$ , and  $P=0.371$ ,

respectively), and D ( $P=0.058$ ,  $P=0.425$ , and  $P=0.859$ , respectively) according to multiple pairwise comparison tests (time effect) for pressure algometer variables within each group for classical acupoints. Group D had a considerably ( $P<0.05$ ) higher Trp4 at post-treatment compared to pre-treatment ( $P=0.005$ ), while groups A ( $P=0.951$ ), B ( $P=0.479$ ), and C ( $P=0.150$ ) had non-significantly ( $P>0.05$ ) higher Trp4 at post-treatment.

Group D, which underwent combined laser and phonophoresis treatment, benefited from these large and non-significant variations in the pressure algometer at post-treatment as a result of the time impact. Additionally, patients in Group D who received both phonophoresis and laser treatment showed improvements in Trp1, Prp2, Trp3, and Trp4 (23.81, 18.13, 21.26, and 55.42%, respectively). These patients were followed by patients in Group C (15.46, 10.44, 10.33, and 13.96%, respectively) who received laser treatment alone, patients in Group B (6.38, 9.43, 8.46, and 7.89%, respectively) who received phonophoresis hydrocortisone + 5% diclofenac, and finally, patients in Group A (1.44, 7.22, 3.61, and 1.09%, respectively) who received phonophoresis hydrocortisone + 1% diclofenac.

Group A, B, C, and D for classical acupoints did not differ significantly ( $P>0.05$ ) in Trp1 ( $P=0.071$ ), Trp2 ( $P=0.250$ ), Trp3 ( $P=0.609$ ), and Trp4 ( $P=0.089$ ) at pre-treatment, according to multiple pairwise comparison tests (group effect). Additionally, there were no significant differences ( $P>0.05$ ) in Trp1 ( $P=0.129$ ), Trp2 ( $P=0.425$ ), or Trp3 ( $P=0.859$ ) across the four groups at the end of treatment. However, there was a significant difference ( $P<0.05$ ) in Trp3 ( $P=0.017$ ) between groups A, B, C, and D after therapy.

Bonferroni test and the mean difference between the groups pairwise for right side bending and Trp4 after treatment. At post-treatment, there were no differences between Group A and Group B (MD=2.46;  $P=0.601$ ;  $P>0.05$ ), Group A and Group C (MD=1.87;  $P=1.000$ ;  $P>0.05$ ), Group A and Group D (MD=3.06;  $P=0.250$ ;  $P>0.05$ ), and Group B and Group D (MD=0.60;  $P=1.000$ ;  $P>0.05$ ). However, there were significant differences in right side bending between Group B and Group C (MD=4.33;  $P=0.026$ ;  $P<0.05$ ) and Group C versus Group D (MD=4.93;  $P=0.007$ ;  $P<0.05$ ) pairwise.

Group A versus Group C (MD=0.67;  $P=0.015$ ;  $P<0.05$ ) and Group A versus Group D (MD=0.72;  $P=0.009$ ;  $P<0.05$ ) showed significant differences in Trp4 at post-treatment, but there were no differences between Group A and Group B (MD=0.19;  $P=1.000$ ;  $P>0.05$ ), Group B and Group C (MD=0.48;  $P=0.170$ ;  $P>0.05$ ), Group B and Group D (MD=0.53;  $P=1.000$ ;

$P>0.05$ ), or Group C versus Group D (MD=0.05;  $P=1.000$ ;  $P>0.05$ ). The combination of the laser program and phonophoresis (Group D) produced the best Trp4 value, according to the post-hoc test and mean differences across groups. The combination of phonophoresis and laser program (Group D) produced the best right side bending and Trp4 values, according to the post-hoc test and mean differences between groups.

Myofacial trigger points: Group A ( $P=0.016$ ,  $P=0.018$ ,  $P=0.029$ , and  $P=0.004$ ), group B ( $P=0.014$ ,  $P=0.014$ ,  $P=0.016$ , and  $P=0.005$ ), group C ( $P=0.009$ ,  $P=0.0001$ ,  $P=0.003$ , and  $P=0.001$ , respectively), and group D ( $P=0.0001$ ,  $P=0.0001$ ,  $P=0.0001$ , and  $P=0.0001$ , respectively) all showed significantly ( $P>0.05$ ) higher levels of right rotation, left rotation, right side bending, and left side bending at post-treatment compared to pre-treatment.

Group D, which underwent combined laser and phonophoresis treatment, benefited from these notable variations in CROM at post-treatment as a result of the time impact. Additionally, patients in Group D who received both phonophoresis and laser treatment showed improvements in their right and left rotation, as well as their right side bending and left side bending (30.92, 34.06, 48.00, and 45.39%, respectively). These patients were followed by patients in Group C (9.42, 11.51, 18.81, and 19.95%, respectively) who received laser treatment alone, patients in Group B (8.82, 7.90, 16.01, and 16.10%, respectively) who received phonophoresis hydrocortisone + 5% diclofenac treatment, and finally, patients in Group A (8.57, 6.97, 13.83, and 15.75%, respectively) who received phonophoresis hydrocortisone + 1% diclofenac treatment.

For myofacial trigger points, groups A, B, C, and D did not differ significantly ( $P>0.05$ ) in right rotation ( $P=0.724$ ), left rotation ( $P=0.064$ ), right side bending ( $P=0.826$ ), or left side bending ( $P=0.559$ ) at pre-treatment, according to multiple pairwise comparison tests (group effect). At post-treatment, however, groups A, B, C, and D differed significantly ( $P<0.05$ ) in right rotation ( $P=0.0001$ ), left rotation ( $P=0.0001$ ), right side bending ( $P=0.0001$ ), and left side bending ( $P=0.0001$ ).

There were non-significantly ( $P>0.05$ ) higher levels of Trp1, Trp2, Trp3, and Trp4 at post-treatment compared to pre-treatment in groups A ( $P=0.047$ ,  $P=0.015$ ,  $P=0.026$ , and  $P=0.021$ , respectively), B ( $P=0.046$ ,  $P=0.009$ ,  $P=0.017$ , and  $P=0.014$ , respectively), C ( $P=0.005$ ,  $P=0.003$ ,  $P=0.005$ , and  $P=0.002$ , respectively), and D ( $P=0.0001$ ,  $P=0.0001$ ,  $P=0.0001$ , and  $P=0.0001$ , respectively) according to multiple pairwise comparison tests (time effect) for pressure algometer variables within each group for myofacial trigger points.

Group D, which underwent combined laser and phonophoresis treatment, benefited from these notable variations in pressure algometer results at post-treatment because of the time impact. Additionally, patients in Group D who received both phonophoresis and laser treatment showed improvements in Trp1, Trp2, Trp3, and Trp4 (84.89, 89.08, 81.05, and 90.30%, respectively). These patients were followed by patients in Group C (55.75, 47.93, 46.96, and 53.45%, respectively) who received laser treatment alone, patients in Group B (27.44, 18.18, 35.97, and 38.97%, respectively) who received phonophoresis hydrocortisone + 5% diclofenac, and finally, patients in Group A (27.22, 14.12, 26.76, and 36.23%, respectively) who received phonophoresis hydrocortisone + 1% diclofenac.

For myofacial trigger sites, groups A, B, C, and D did not differ significantly ( $P>0.05$ ) in Trp1 ( $P=0.096$ ), Trp2 ( $P=0.062$ ), Trp3 ( $P=0.647$ ), and Trp4 ( $P=0.266$ ) at pre-treatment, according to multiple pairwise comparison tests (group effect). However, groups A, B, C, and D showed substantial ( $P<0.05$ ) changes in Trp1 ( $P=0.0001$ ), Trp2 ( $P=0.0001$ ), Trp3 ( $P=0.0001$ ), and Trp4 ( $P=0.0001$ ) at the end of treatment.

Bonferroni test and mean difference between paired groups for CROM and pressure algometer at post-treatment. On the CROM (right rotation, left rotation, right side bending, and left side bending) and pressure algometer (Trp1, Trp2, Trp3, and Trp4), there were no significant differences ( $P>0.05$ ) between groups A and B, A and C, and B and C. Nonetheless, the mean differences between the other three groups—groups A and D, B and D, and C and D—were significantly different ( $P<0.05$ ).

The combination of the phonophoresis and laser program (Group D) produced the best CROM (right rotation, left rotation, right side bending, and left side bending) and pressure algometer (Trp1, Trp2, Trp3, and Trp4) values, according to the post-hoc test and mean differences across groups.

## CONCLUSION

According to the study's findings, all groups experienced an improvement in cervical range of motion and a reduction in pain intensity; however, the phonophoresis and LLLT group experienced greater gains than the other groups. When it comes to lowering pain and increasing CROM classical acupoints and myofascial trigger points, LLLT and phonophoresis work better together than any treatment alone.

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