The effects of Arthrostim percussion therapy on upper trapezius trigger points

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ABSTRACT

Objective: To determine the effects of Arthrostim percussion therapy on upper trapezius trigger points.

Methods: This observational study was approved by Logan Institutional Review Board. Data from 40 subjects on PPT readings, on each a treated and untreated side, with pre and post measurement. Subjects were randomly selected to be in the R and S group. Briefly, there were 18 subjects in the R group and 22 in the S group. Subject in the R group had significantly higher pretreatment measurements on both the treated and untreated side {Treated: 14.01 vs 8.28, $p<.0001$. Untreated: 13.27 vs 9.51, $p=.007$} (table 1).

Results: No statistical significant differences were found for the total sample between "pre-treatment" and "post-treatment". On the treated side, there was a non-significant difference in the magnitude of change between post and pre measurements when comparing the R and S groups (1.03 vs 0.27, $p=0.61$) Similarly, on the untreated side, there was a non-significant difference in the magnitude of change between post and pre measurements when comparing the R and S groups (0.84 vs 0.53, $p=0.85$)

Conclusion: Treated versus non-treated trigger points were not significantly different in the observed/measured participants. Further research with equivalent groups, multiple treatments, and longer follow-up measurements is needed to determine the efficacy of this modality for trigger point therapy.

Key Words: *Trigger point, Arthrostim, Algometer*

Effects of Arthrostim percussion therapy on trigger points

Introduction:

Trigger points are discrete, local, hyperirritable spots located in a taut band of muscle. They produce pain locally and in a referred pattern and often accompany chronic musculoskeletal disorders [1]. There have been multiple studies performed to determine the most effective form of treatment for trigger points, examples ranging from acupuncture, guasha, ultrasound, and cross friction massage. The most simple form of treatment is sustained manual treatment, which has been advocated as effective treatment for myofascial trigger points. (MTrPs) [2]. It was also discovered that the myofascial trigger point irritability could be suppressed after a remote acupuncture treatment [3]. This stems from the rationale that properties of trigger points — their widespread distribution and the pain relief produced by stimulating them — resemble those of acupuncture points for the relief of pain [4]. Another form of treatment used rather widely is trigger point injections with an analgesic. In a study involving such treatment comparing the use of dry needling versus injection of lidocaine to treat trigger points, the study showed that 58 percent of patients reported complete relief of pain immediately after trigger-point injection and the remaining 42 percent of patients claimed that their pain was minimal (1–2/10) on the pain scale[5]. A third treatment option is known as spray-and-stretch. This treatment technique consists of spraying a topical ointment onto the area of the trigger point to inhibit pain and stretch reflexes. Once this has occurred the muscle is able to be stretched to its normal length allowing the trigger point to release. In one such study involving 65 patients subdivided into 3 groups all groups showed significant improvements in their VAS scores after 3 days. The groups either received a topical ointment only, and injection only or both. All groups had significant improvement.[6]

A fairly new modality used within the chiropractic profession is known as the arthrostim. The device is more user specific as it can be adjusted to deliver from a few ounces of force up to 40 pounds of force. The force is adjusted depending on the initial pressure placed upon the patient's body by the practitioner. The commercial ArthroStim instrument produces twelve

thrusts a second. Twelve hertz is a higher frequency than that achieved with more traditional adjustment devices. This frequency is known as "the low beta somatomotor rhythm." This frequency is said to more correctly reverberate through the joint and into more distant tissues, which in turn releases more distant trigger points.[7] The purpose of this study is to determine the effects that arthrostim will generate on upper trapezius trigger points.

Materials and Methods:

The specific aim of this study was to determine whether arthrostim will decrease trigger points in the upper trapezius musculature. Patients were recruited at random from the student body of Logan College of Chiropractic. Forty-seven students participated in the initial treatment with 40 completing the follow up assessment on day two. Subjects in the experimental group had a history of chronic trigger points in their upper trapezius. Subjects were all Logan College of Chiropractic students, and had to refrain from the chiropractic adjustment for 24 hrs, once the initial algometer reading was recorded. The participant had to have an algometer reading of ≥ 10 pounds of pressure to be considered a trigger point. If the participant was currently pregnant, they were not allowed to participate in this study. If they had a history of neurologic disease, or severe neck issues involving surgery or trauma to the upper trapezius area they were excluded. The participants were not allowed to have spinal manipulation 24 hours prior to the study, or 24 hours after the initial alogometer reading. They also were not allowed to have any sort of physical therapy modality such as electrical stimulation, ultrasound, or laser in the 24 hours prior or the 24 hours after the alogmeter reading. Also, muscle relaxers or topical products like biofreeze were not allowed to be used during the allotted time. Individuals who were using supplementation which affect the neuromusculoskeletal system were not eligible to participate in the study.

The trigger points in the upper trapezius were marked with a skin marking pencil. We also marked another spot on the participant. This spot was marked with a different color skin marking pencil and remote from the trigger point. The algometer threshold for the trigger points was read and documented. Once the trigger was marked, the subject received the Arthrostim treatment, at either the actual trigger point if experimental or sham marking if in the control. The researcher treating with the arthrostim was blinded to whether they were treating a true trigger

point or a sham point on the patient. All visits with each research participant were completed in the science building of Logan Chiropractic College, where the Arthrostim was located.

Participants were palpated to confirm trigger points and an algometer was used to measure pain perception of each individual (by trained student research assistant). The threshold for the algometer was determined via patient tolerance to pressure applied. The participant had to have an algometer reading of ≥10 pounds of pressure to be considered a trigger point. The number reading was then recorded. Treatment was delivered with the chiropractic modality named the Arthrostim. This device can deliver from a few ounces of force up to 40 pounds of force. The force was applied depending on the initial pressure placed upon the patient's body by the practitioner. The commercial ArthroStim instrument produces twelve thrusts a second. Twelve hertz is a higher frequency than that achieved with more traditional adjustment devices such as the activator. This frequency is said to more correctly reverberate through the joint and into more distant tissues, which in turn releases more distant trigger points.

The treatment group received Arthrostim on the trigger point. The sham group received the Arthrostim on the remote marked position marked in a different color on the participant. This ensured that no changes were made to the trigger point during the sham treatment.

Both the experimental and control participants were required to come back within the next 24 hrs to get a follow up algometer reading on their trigger point. A trained student research assistant who is blinded to treatment and sham individuals performed this reading.

Results:

Of the 47 patients who participated in the initial assessment and treatment, 40 returned 24 hours later for the follow up assessment. Of the 24 patients who received a treatment on an active trigger point 18 returned for the follow up. Of these, 11 saw positive improvement in the algometer reading on their trigger point. The other 7 had relative soreness. The average change in algometer reading over all was 1.03 pounds of pressure. Of the non treated points marked on the patients, 10 of these also showed improvement on the follow up assessment and the other 8 showed an increase in tenderness. The average change for these points was .835 pounds of pressure.

Of the 23 patients who received a sham treatment 22 returned for the follow up. Of those, 10 showed an improvement in the algometer reading of the sham area that was treated. The other 12 showed an increase in tenderness over this area. The average change was an increase in algometer reading of .286 pounds of pressure. Of the nontreated area marked on the patients that received a sham adjustment, 7 showed an increase in algometer reading upon follow up assessment. The other 15 were more tender when measured. The average change of the non treated areas marked on the patients who received a sham adjustment was an increase of .557 pounds of pressure.

Data from 40 subjects on PPT readings, on each a treated and untreated side, with pre and post measurement. Subjects were randomly selected to be in the R and S group. Briefly, there were 18 subjects in the R group and 22 in the S group. Subjects in the R group had significantly higher pretreatment algometer readings on both the treated and untreated side {Treated: 14.01 vs 8.28, $p<.0001$. Untreated: 13.27 vs 9.51, $p=.007$} (table1).

On the treated side, there was a non-significant difference in the magnitude of change between post and pre measurements when comparing the R and S groups (1.03 vs 0.27, $p=0.61$) (Figure1). Similarly, on the untreated side, there was a non-significant difference in the magnitude of change between post and pre measurements when comparing the R and S groups (0.84 vs 0.53, $p=0.85$) (Figure1). These results indicate that the treatment group had no association with the magnitude of change between pre and post measurements. All analysis was performed with SAS 9.3 (Cary, NC)

table1			
	R/S		
	R n = 18	S n = 22	P-Value
Raw Measures			
Treated Post treat	15.04 ± 5.10	8.55 ± 4.64	< 0.001
Treated side pre treatment	14.01 ± 3.45	8.28 ± 2.99	< 0.001
Nontreat postreat	14.11 ± 6.38	10.04 ± 5.73	0.041
nontreat pre treat	13.27 ± 4.28	9.51 ± 4.05	0.007
Differences			
Treated Side: Post-Pre	1.03 ± 5.73	0.27 ± 3.48	0.608
Nontreated Side: Post-Pre	0.84 ± 5.50	0.53 ± 4.67	0.851
Continuous variables compared using Student's T-test. Categorical variables compared using chi-square or Fisher's exact test.			

Figure1: Treated Side

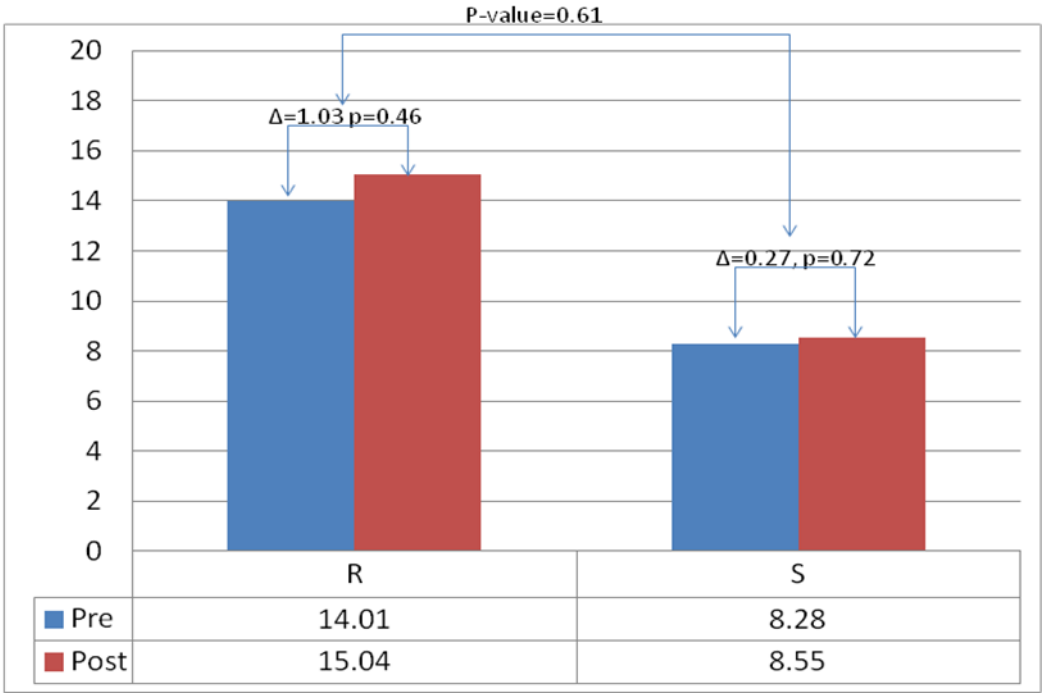
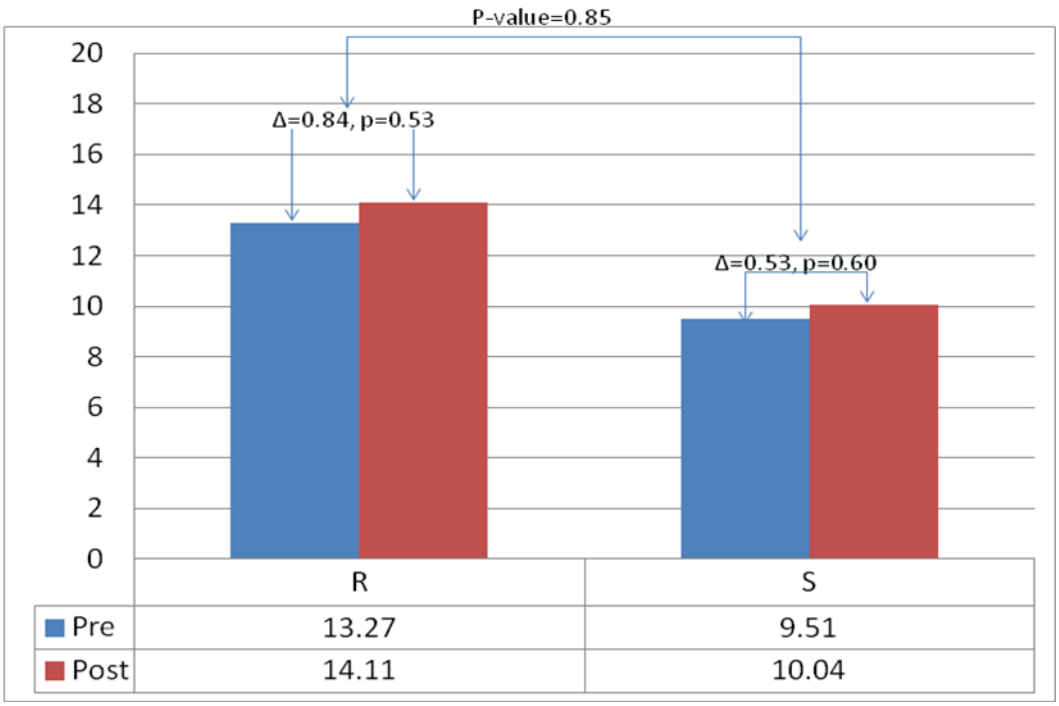


Figure2: Nontreated Side



Discussion:

The results discussed above show that there were no statistically significant changes within or between groups before and after Arthrostim treatment, however, some patients were markedly more tender on the second assessment. This may have been because of soreness due to the treatment itself being very rigorous and also the time frame of reassessment being only 24 hours. The decrease in MTrP sensitivity in the current study are similar to those found in the remote AcP,[3] the study comparing topical analgesic ointment to injection therapy,[5] and the study using spray and stretch.[6]

Limitations of this study include: The pre-treatment difference between the higher and lower algometer reading groups, a short time interval between pre and post treatment algometer readings, possible operator error with the algometer, and inaccuracy of exact trigger point location. There may have been operator error involved. Since the original points marked on the patients were marked with a skin marking pencil and most of them washed off by the next treatment, the researchers were forced to palpate based on a body chart of where the original treatments were. It is possible that the trigger points measured upon follow up assessment were not accurately correlated to the original points measured. A solution to remedy this problem

would be to use a marking device that would be present on the date of remeasurement. Permanent marker would work well or some form of tape such as kinesio tape.

According to Lee et al. in an article titled "Using Guasha to Treat Musculoskeletal Pain: A Systematic Review of Controlled Clinical Trials", the outcomes were not clinically relevant because of high risk of experimental biases.[8] There is a large possibility that the patients may experience day to day changes in their sensitivity on a given trigger point as well as the ability of the examiner to be testing in the exact same place as the first day. This could be avoided in further studies by asking patients to leave an adhesive marker on the points, that will not easily wash off, until the follow up visit, or perhaps a marker more permanent than a skin marking pencil.

Furthermore, many therapies used for trigger point treatments require multiple treatments over a longer period. It is generally common practice to not treat trigger points with a large force modality two days in a row. The reasoning for this is because the patients often experience a mild increase in tenderness for a few days due to the aggressive nature of such therapies. According to an article by Howitt et al., "Symptom and objective improvement is often evident in the first to third treatment. A 50% improvement within this timeframe is common and may be expected."[4] Similarly to this, we found that many of the patients showed marked improvement following the first visit but several others were much more tender. Once combined, the data as a whole did not show this and had no magnitude of change with treatment.

Further studies that seek to eliminate the possibility of these biases may yield more conclusive evidence. The possible inaccuracies in measuring the exact same points, the short time frame in which the study was performed, as well as the possible variability in patient sensitivity are all problems that may be resolved in future studies. Further studies are warranted to further invest into the efficacy of Arthrostim therapy for the treatment of trigger points in the upper trapezius.

Conclusion:

In conclusion, our results showed no significant post-treatment changes in trigger point sensitivity for either the higher or lower pre-treatment algometer reading groups. Further

research with equivalent groups, multiple treatments, and longer follow-up measurements is needed to determine the efficacy of this modality for trigger point therapy.

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