

Soft Tissue Mobilization Improves Neck and Upper Back Range of Motion

Original Research

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Open Access

Published: November
11, 2022



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Research Directs in
Therapeutic Sciences:
2022, Volume 1 (Issue
1): 2

Abstract

Introduction: Limited research reveals that the use of different soft tissue mobilization techniques increases tissue mobility and decreases pain in various regions of the body. The purpose of this study was to determine if there was a difference between instrument-assisted soft tissue mobilization and cupping therapy for neck and upper back discomfort.

Methods: Subjects were treated for neck and upper back discomfort using one of two soft tissue mobilization techniques. They were assessed with a numeric rating scale, neck range of motions, and superficial skin temperature before and after each treatment to document changes observed.

Results: There was a statistically significant difference in range of motion, superficial skin temperature, and pain numeric rating scale regardless of the treatment ($P < .05$).

Conclusions: Both methods of soft tissue mobilization showed to have a significant impact on pain and neck range of motion. Based on patient-clinician collaborative treatment process, healthcare providers should consider IASTM and cupping therapy.

Key Words: Instrument Assisted Soft Tissue Mobilization, Cupping, Pain

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Introduction

Neck/upper back tightness and discomfort can significantly impair quality of life. Several factors can increase the occurrence of neck/upper back tightness and discomfort.¹ Range of motion is an indirect indicator of the impacts that discomfort or pain can have on activities of daily living.¹ Underlying causes of neck and upper back pain include myofascial adhesions, mechanical limitations, joint dysfunction, nerve-related pathologies, stress, postural deficits, and lack of exercise.² Therapeutic interventions, such as manual therapies that reduce muscle tension and increase blood flow, can help relieve discomfort and promote joint mobility.^{3,4}

Instrument-assisted soft tissue mobilization (IASTM) and cupping therapy (CT) are the therapeutic interventions chosen for this study, and they.^{3,4} IASTM, derived from Gua Sha, uses steel instruments of various shapes with curves, edges, and points designed to mimic the body's natural contours. Clinicians sweep IASTM tools with pressure across the skin to release adhesions, mobilize myofascial tissue and improve blood and lymphatic circulation.³ The type of cupping therapy used in this study was a dry cupping, which was moved in gliding motions across the skin.² Both therapeutic interventions increase range of motion (ROM) or mobility in patients with limitations in other areas of the body.^{5,6}



This study aimed to analyze the effects of IASTM and CT on mobility, circulation, and pain perception. We hypothesized that (1) either IASTM or CT, when applied to one side, would create improvements on opposite side rotation and lateral flexion and that (2) both treatments would increase skin temperature and decrease pain perception.

Scientific Methods

Participants

A sample of 30 subjects (males = 11; females = 19; average age = 26.5 years old) with neck and/or upper back discomfort participated in this study. Exclusion criteria included but not limited to open wounds/unhealed suture sites/sutures, thrombophlebitis, uncontrolled hypertension, inflammatory conditions due to infection, unstable fractures, hypersensitivity/intolerance, contagious or infectious skin conditions, hematoma/myositis ossificans, osteomyelitis and insect bite of unexplained origin. This study was approved by the institutional review board of the University of the Incarnate Word prior to the start of the study. A randomize generator on Excel was used to determine the order and side of treatment for each subject prior to their enrollment in the study to prevent treatment effects on each other and ensure that the results reflect the true treatment effects.

Protocol

Subjects volunteered based on self-reporting of neck and upper back discomfort. The dependent variables, measured before and after each bout of treatment, were the numeric rating scale (NRS) for subjective assessment of discomfort, Baseline Bubble Inclinometer measurements of neck range of motion, and an infrared thermometer with laser (General Tools IRT650, General Tools & Instruments LLC, Secaucus, NJ) measurement for superficial skin temperature at the base of the neck. The subject was positioned for treatment on the end of the table in a seated position. Subsequently, an emollient (Graston Technique Soft Tissue Mobilization Emollient; Graston Technique LLC, Indianapolis, IN) was applied over the entire treatment area. Each treatment was administered by a certified athletic trainer trained in IASTM. The instrument (HG8 instrument, HawkGrips, Conshohocken, Pennsylvania) was used at a 30° to 45° angle with moderate pressure using sweeping strokes across the upper trapezius area in all directions. The CT (Hansol Cupping Therapy Equipment; Made in Korea) method was used with a plastic cup withdrawing one full squeeze with the extractor. The cup was moved along the treatment area in a sweeping motion across the neck and upper back region for five minutes. The 5-minute treatment time was based on a previous study⁷ that also used a 5-minute IASTM treatment. CT treatment time was kept at 5 minutes to avoid confounding effects. All subjects received IASTM and cupping therapy treatments, with one intervention administered per side of the body, but the order of treatment and side was randomized in advance. After each treatment, the measurements were repeated in the same order. Then the process was followed on the opposite side using the other intervention technique. Finally, upon completing the administration of both treatments and data collection, a survey question asked all participants to choose a subjective preferred mode of treatment.

Statistical Analysis

All statistical analyses were performed using SPSS (version 27; IBM Corp, Armonk, NY). A 2 (IASTM and CT) x 2 (pre- and post-intervention) repeated measures analysis of variance (ANOVA) was used to compare the dependent variables. The dependent variables compared pre- and post-intervention included the NRS, inclinometer measurements, and superficial skin temperature. Measurements for each movement were collected from three trials, with the highest degree measurement recorded for analysis. Paired T-tests were run to assess the differences observed during the repeated measure ANOVA. The alpha level was set a priori at $P < .05$.

Results

The means and standard deviations for all dependent variables are reported in Tables 1, 2, and 3. A 2x2 (intervention x time) repeated measures ANOVA revealed no significant main effect difference between treatments (IASTM vs. CT) for inclinometer measurement for ipsilateral and contralateral side, superficial skin temperature, or pain numeric rating scale ($P > .05$). There were statistically significant differences for each treatment over time (pre-vs post-intervention) for inclinometer measurements, superficial skin temperature, and pain numeric rating scale regardless the treatment ($P < .05$). Sixty percent of subjects preferred CT ($n=18$) over IASTM ($n=12$).

Table 1. Means and Standard Deviations for Inclinator Measurement

	Pre-Intervention	Post-Intervention	Confidence Interval (Pre);(Post)	Effect Size
IASTM - LF				
Ipsilateral	47.73±7.60	51.70±9.01*	(44.90,50.57);(48.33,55.10)	.32
Contralateral	47.30±8.28	51.43±8.68*	(44.21,50.39);(48.19,54.67)	.41
TC - LF				
Ipsilateral	49.13 ±9.22	51.83±9.10*	(45.69,52.58);(48.44,55.23)	.22
Contralateral	49.53±7.38	52.23±8.16*	(46.77,52.29);(49.19,55.27)	.14
IASTM - ROT				
Ipsilateral	74.67±12.58	78.20±15.68*	(69.97,79.36);(72.37,84.05)	.13
Contralateral	71.57±13.72	77.47±16.43*	(66.44,76.69);(71.33,83.60)	.32
TC - ROT				
Ipsilateral	74.60±17.39	77.40±15.10	(68.11,81.09);(71.76,83.04)	.11
Contralateral	75.90±14.18	79.93±12.68*	(70.61,81.19);(75.20,84.67)	.25

P value is listed for each intervention main effect comparing pre- and post-intervention. (Pre-to Post-Intervention significance – P<0.05 =*) (IASTM – Instrument Assisted Soft Tissue Mobilization; TC – Therapeutic Cupping; LF – Lateral Flexion; ROT– Rotation)

Table 2. Means and Standard Deviations for Superficial Skin Temperature

	Pre-Intervention	Post-Intervention	Confidence Interval (Pre);(Post)	Effect Size
IASTM	33.22±1.35	34.69±1.29*	(32.72,33.73);(34.21,35.18)	.59
TC	33.33±1.22	35.37±0.89*	(32.88,33.79);(35.03,35.70)	.84

P value is listed for each intervention main effect comparing pre- and post-intervention. This measure had a P = .637 for interaction between interventions. (Pre-to Post-Intervention significance – P<0.05 =*) (IASTM – Instrument Assisted Soft Tissue Mobilization; TC – Therapeutic Cupping)

Table 3. Means and Standard Deviations for Numeric Rating Scale

	Pre-Intervention	Post-Intervention	Confidence Interval (Pre);(Post)	Effect Size
IASTM	2.57±1.80	1.47±1.33*	(1.88,3.25);(.97,1.97)	.48
TC	2.42±1.74	1.20±1.16*	(1.77,3.06);(.77,1.63)	.43

P value is listed for each intervention main effect comparing pre- and post-intervention. This measure had a P = .540 for interaction between interventions. (Pre-to Post-Intervention significance – P<0.05 =*) (IASTM – Instrument Assisted Soft Tissue Mobilization; TC – Therapeutic Cupping)

Discussion

While the benefits of IASTM and CT are mainly theoretical, both therapies are thought to reduce pain and promote healing through improved localized circulation.^{5,6} As hypothesized, we found both therapies to significantly increase superficial temperature (P<.05), which has been seen in other studies.⁸⁻¹⁰ Increased temperature likely results from increased circulation and an influx of nutrients and fibroblasts into the area that aid healing.¹⁰ IASTM may have the added benefit of reducing tissue adhesions through the mechanical breakdown of scar tissue.⁵

As hypothesized, this study demonstrates that IASTM and CT decrease perceived pain and acutely increase the cervical spine and upper thorax range of motion. While several other studies have looked at how these therapies affect ROM



and pain,^{1,2,6,7,11-18} research that directly compares the effects of IASTM and CT on the spine appears nonexistent. Significant research exists indicating the effectiveness of IASTM on short- and long-term range of motion. Our findings align with previous research that has shown improvements in the hamstring,¹¹ ankles,⁷ lumbar,¹² hip,¹³ and shoulder ROM¹⁴ using IASTM. The use of IASTM in conjunction with exercise was utilized on subjects with neck pain and forward-head posture,¹ and short-term cervical flexion and extension ROM improvements were found as well as decreased pain which was maintained for up to four weeks.

The evidence on cupping and ROM is more limited. A 5-minute treatment with flame-heated cups was found to improve hamstring flexibility as well as static stretching.⁶ However, other authors found no improvement on hamstring flexibility with CT.^{15,16} The primary benefit of CT appears to be pain modulation. Our research agrees with the existing evidence that CT significantly decreases perceived pain.^{2,17}

This study has several limitations. Treatments were limited to a single 5-minute session that was generalized to the body region; trigger points or soft tissue restrictions were not intentionally targeted to protect the integrity of the study. Due to our convenience sampling and small sample size, this research has limited generalizability to a larger population or populations with various health conditions. This comparison study had no true control, so the effects of the treatments may have confounded one another or been the result of a placebo effect. In previous research, IASTM (Graston technique ®) was shown to be no more effective on pain and ROM than a sham treatment.¹⁸

Conclusions

While research seems to support the use of IASTM and CT for improving ROM and reducing pain, future research needs to focus on best practices regarding treatment methods, duration, and frequency; existing research varies widely in these areas. Nonetheless, IASTM and CT seem to be simple, effective treatment options for improving short-term pain and mobility. Although the results between the treatment techniques are similar, it is recommended that clinician and patient preference be the primary determiner of modality.

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