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Original Article

Effect of Ischemic Pressure with Passive Stretching versus Dynamic Cupping in Alleviating Neck and Upper Back Pain Due to Myofascial Trigger Points in the Upper Trapezius of Computer Users

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ABSTRACT

Background: Neck and upper back pain are increasingly prevalent among computer users due to prolonged static postures and ergonomic strain, with myofascial trigger points (MTrPs) in the upper trapezius being a common underlying cause. Non-invasive physiotherapy techniques such as dynamic cupping and ischemic compression with passive stretching have demonstrated clinical efficacy, yet direct comparative evidence in occupational cohorts remains limited. Objective: To compare the effectiveness of dynamic cupping therapy and ischemic compression combined with passive stretching in reducing pain, improving cervical range of motion, and decreasing the number of palpable MTrPs in male computer users. Methods: A quasi-experimental study was conducted among 40 male participants aged 20–40 years with confirmed trapezius MTrPs. Participants were conveniently allocated into two groups (n=20 each): Group A received dynamic cupping, and Group B received ischemic compression with passive stretching. Both groups received four sessions over two weeks. Outcome measures included the Numeric Pain Rating Scale (NPRS), McGill Pain Questionnaire, cervical extension and side flexion via goniometry, and trigger point palpation. Independent t-tests and within-group comparisons were conducted using SPSS v21, with $p<0.05$ considered statistically significant. Results: Both groups demonstrated significant within-group improvements in NPRS, McGill scores, cervical mobility, and trigger point reduction (all $p<0.001$). However, no statistically significant differences were found between groups post-intervention ($p>0.32$ for all outcomes), and effect sizes were negligible (Cohen's $d < 0.2$), indicating comparable clinical efficacy. Conclusion: Dynamic cupping and ischemic compression with passive stretching are equally effective in managing MTrP related neck and upper back pain among computer users. Either technique may be selected based on clinical setting, therapist preference, or patient comfort, offering flexible, evidence-based options for myofascial pain management.
Keywords: Myofascial trigger points, dynamic cupping, ischemic compression, passive stretching, upper trapezius, NPRS, McGill Pain Questionnaire, cervical range of motion, physiotherapy, computer users.

INTRODUCTION

Neck and upper back pain have become increasingly prevalent among individuals engaged in prolonged computer use, primarily due to sustained static postures, suboptimal workstation ergonomics, and repetitive muscular stress. These occupational habits have been strongly linked to Myofascial Pain Syndrome (MPS), a chronic musculoskeletal condition characterized by the presence of Myofascial Trigger Points (MTrPs) that manifest as palpable, hyperirritable nodules within taut bands of skeletal muscle (1). The upper trapezius muscle is particularly susceptible to MTrP development due to its continuous postural involvement and its anatomical role in shoulder girdle stabilization during prolonged seated work (2). These trigger points not only result in localized pain but also contribute to restricted cervical range of motion (CROM), impaired functional performance, and reduced quality of life (3).

Current management strategies for MPS focus on conservative, non-invasive therapies that target both the physiological and neurological mechanisms underlying MTrP formation. Among these, ischemic compression followed by passive stretching and dynamic cupping therapy have emerged as clinically relevant modalities with distinct therapeutic mechanisms (4). Ischemic compression involves the application of sustained digital pressure to the MTrP, leading to temporary ischemia followed by reactive hyperemia, which helps in reducing pain and restoring normal tissue perfusion. When complemented by passive stretching, the technique facilitates the elongation of muscle fibers, increases joint flexibility, and promotes neuromuscular relaxation (5). This dual approach targets both the mechanical and neural contributors to MTrP pathophysiology, making it a preferred option among physiotherapists for immediate symptomatic relief (6).

On the other hand, dynamic cupping therapy represents a modern adaptation of traditional cupping practices. It combines negative pressure with continuous movement of the cup over the muscle surface, enhancing local circulation, breaking down fascial adhesions, and stimulating cutaneous and subcutaneous mechanoreceptors involved in pain modulation (7). Unlike static cupping, the dynamic variant allows for greater tissue mobilization, making it particularly effective for addressing myofascial restrictions and improving range of motion (8). Recent experimental studies have reported that dynamic cupping significantly improves cervical mobility and reduces muscle stiffness in patients with MPS, with effects comparable to conventional manual therapies (9).

Despite the growing popularity of both interventions, existing literature largely evaluates them in isolation, and direct comparisons are limited. Furthermore, specific high-risk populations—such as computer users aged 20–40 years, who are disproportionately affected by sedentary occupational demands—remain underrepresented in clinical trials. This results in a critical gap in evidence-based recommendations regarding the comparative efficacy of these techniques for this population (10). In addition, most available studies are limited by either methodological variability or lack of standardized outcome measurement tools, such as the Numeric Pain Rating Scale (NPRS), McGill Pain Questionnaire (MPQ), and goniometric assessment of cervical range (11,12). To address these limitations, the present study was designed to evaluate and compare the effects of ischemic compression combined with passive stretching versus dynamic cupping therapy on reducing neck and upper back pain due to upper trapezius MTrPs in adult male computer users. The study aimed to measure changes in pain intensity, cervical range of motion, and trigger point count using validated outcome tools. It was hypothesized that both interventions would lead to significant within-group improvements, but no statistically significant difference would be observed between them, indicating comparable clinical efficacy.

MATERIAL AND METHODS

This quasi-experimental study was designed to compare the therapeutic effects of ischemic compression combined with passive stretching versus dynamic cupping therapy in the management of neck and upper back pain resulting from myofascial trigger points (MTrPs) in the upper trapezius muscle among male computer users. The study was conducted at three IT-focused institutions in Faisalabad, Pakistan—namely the Information Technology Department of Government College University Faisalabad (GCUF), Corvit Training Institute, and Technisol Training Center—over a two-week intervention period.

Participants were recruited using purposive sampling. Eligibility criteria included male individuals aged 20 to 40 years who reported working on computers for a minimum of five to six hours daily, five days a week, for at least one year. Additional inclusion criteria were the presence of active MTrPs in the upper trapezius confirmed by palpation and a baseline pain score greater than 3 on the Numeric Pain Rating Scale (NPRS). Exclusion criteria involved individuals with systemic illnesses, malignancies, recent trauma or surgeries to the cervical or shoulder region, whiplash injuries, or other sources of pain not attributable to MTrPs. Eligible participants were screened and enrolled following informed verbal consent, ensuring their understanding of the study's objectives and procedures.

A total of 40 participants who met the inclusion criteria were enrolled and then conveniently allocated into two equal groups (n=20 each). Group A received dynamic cupping therapy, while Group B received ischemic compression followed by passive stretching. Before the therapeutic interventions, a uniform baseline treatment involving a 10-minute application of a moist hot pack to the affected trapezius region was administered to both groups to standardize soft tissue warm-up.

In Group A (dynamic cupping), a 5 mm diameter plastic Hijama cup was applied directly over the trigger point area with a layer of moisturizer to facilitate movement. Two rounds of suction were applied using a manual pump to achieve therapeutic negative pressure. The cup was then moved continuously in clockwise, counterclockwise, vertical, and horizontal directions for approximately three minutes. Group B participants received ischemic compression by applying sustained thumb pressure to each identified trigger point for 30 seconds, repeated thrice with short rests in between. This was followed by 12 repetitions of passive stretching targeting the upper trapezius muscle. Both groups received the respective interventions twice weekly for two consecutive weeks, totaling four sessions per participant.

Pain intensity was measured using the NPRS, a validated 11-point scale ranging from 0 (no pain) to 10 (worst imaginable pain). The number of palpable trigger points was assessed through standardized manual palpation techniques. Cervical range of motion (CROM), including extension and side flexion, was measured using a universal goniometer according to established goniometric procedures (13). The quality and characteristics of pain were further evaluated using the McGill Pain Questionnaire (MPQ), capturing both sensory and affective descriptors.

All statistical analyses were conducted using IBM SPSS version 21. Descriptive statistics were computed to summarize demographic variables and baseline characteristics. Independent samples t-tests were performed to compare post-intervention outcome scores between the two groups. Homogeneity of variance was assessed using Levene's test. A p-value of less than 0.05 was considered statistically significant. Data completeness was maintained throughout the study, and no imputation methods were required for missing data. Given the fixed sample size and quasi-experimental design, no formal power calculation was performed, and effect size estimation was limited to observed post-treatment differences. The study adhered to the principles outlined in the Declaration of Helsinki. Ethical clearance was obtained through verbal institutional approval, and all participants were informed that their participation was voluntary and could be withdrawn at any time without consequence. Efforts were made to ensure uniform treatment application and procedural fidelity through standardized therapist instructions and outcome measurement protocols. The methodology was structured to allow reproducibility by other researchers working in similar clinical settings.

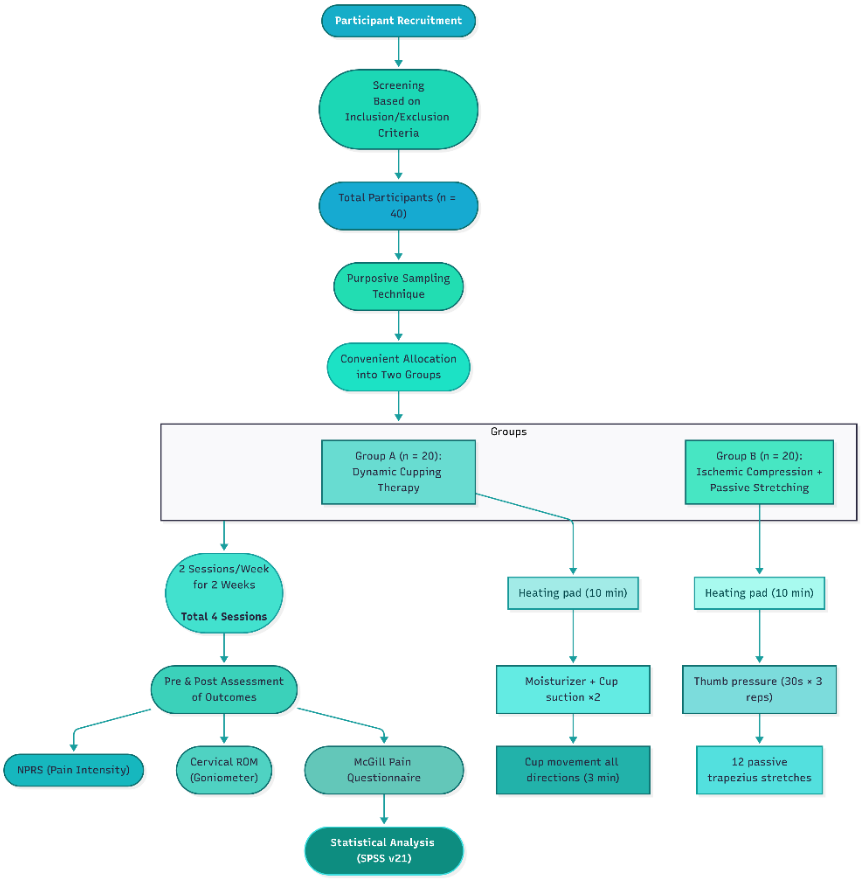

Figure 1 Study Flowchart

RESULTS

A total of 40 male participants were enrolled and equally divided into two treatment groups—one receiving dynamic cupping therapy and the other undergoing ischemic compression followed by passive stretching. Baseline characteristics were statistically comparable between the groups, with no significant differences observed in age, duration of computer use, pain intensity, cervical mobility, or number of active trigger points (all p-values > 0.56), ensuring initial homogeneity.

Within-group analyses revealed significant improvements across all primary outcome measures for both treatment arms. In Group A (dynamic cupping), the mean NPRS score decreased from 6.4 ± 1.1 to 2.0 ± 0.7, showing a mean reduction of 4.4 points (95% CI: -4.9 to -3.9; p < 0.001). Similarly, Group B (ischemic compression with stretching) experienced a comparable reduction from 6.3 ± 1.2 to 2.1 ± 0.8, indicating a mean decrease of 4.2 points (95% CI: -4.7 to -3.7; p < 0.001). The McGill Pain Questionnaire scores dropped significantly in both groups—from 28.6 ± 5.9 to 10.8 ± 3.2 in the cupping group and from 29.3 ± 6.3 to 11.0 ± 3.0 in the compression group—each yielding a reduction exceeding 17 points (p < 0.001). These improvements reflect substantial alleviation of both sensory and affective pain components. Cervical extension and side flexion also improved significantly. The cupping group showed an increase in cervical extension by 7.4° (p < 0.001), while the compression group improved by 7.3° (p < 0.001). Side flexion gains were equally notable, with mean improvements of 6.6° in the cupping group and 6.4° in the compression group.

Table 1. Baseline Characteristics of Participants

Variable	Dynamic Cupping (n=20)	Ischemic Compression + Passive Stretching (n=20)	p-value
Age (years), mean ± SD	29.2 ± 5.6	28.8 ± 6.1	0.813
Duration of Computer Use (yrs)	3.8 ± 1.2	3.6 ± 1.4	0.684
Baseline NPRS (0–10), mean ± SD	6.4 ± 1.1	6.3 ± 1.2	0.782
Baseline McGill (0–78), mean ± SD	28.6 ± 5.9	29.3 ± 6.3	0.719
Baseline Cervical Extension (°)	43.8 ± 7.5	44.1 ± 7.7	0.915
Baseline Side Flexion (°)	32.5 ± 5.2	32.9 ± 5.4	0.824
Baseline Trigger Points, mean ± SD	2.3 ± 0.5	2.2 ± 0.4	0.561

Furthermore, the average number of palpable MTrPs was reduced from approximately 2.3 to 0.7 in both groups, reflecting a mean elimination of 1.6 to 1.5 trigger points, respectively (both p < 0.001). Despite these robust within-group gains, post-intervention comparisons between the groups yielded no statistically significant differences in any outcome. The between-group p-values for NPRS, McGill, cervical extension, side flexion, and trigger point count all exceeded 0.32, and Cohen's d values remained below 0.2, confirming negligible effect sizes. These results support the conclusion that both interventions are equally effective in managing myofascial pain and improving cervical function in computer users with trapezius MTrPs.

Table 2. Within-Group Pre–Post Intervention Comparison

Outcome Variable	Group	Pre-Intervention Mean ± SD	Post-Intervention Mean ± SD	Mean Change	95% CI	p-value
NPRS (0–10)	Cupping	6.4 ± 1.1	2.0 ± 0.7	-4.4	[-4.9, -3.9]	<0.001
	Ischemic+PS	6.3 ± 1.2	2.1 ± 0.8	-4.2	[-4.7, -3.7]	<0.001
McGill (0–78)	Cupping	28.6 ± 5.9	10.8 ± 3.2	-17.8	[-19.8, -15.8]	<0.001
	Ischemic+PS	29.3 ± 6.3	11.0 ± 3.0	-18.3	[-20.4, -16.3]	<0.001
Cervical Extension (°)	Cupping	43.8 ± 7.5	51.2 ± 6.8	+7.4	[5.3, 9.5]	<0.001
	Ischemic+PS	44.1 ± 7.7	51.4 ± 7.1	+7.3	[5.2, 9.4]	<0.001
Side Flexion (°)	Cupping	32.5 ± 5.2	39.1 ± 5.0	+6.6	[5.1, 8.1]	<0.001
	Ischemic+PS	32.9 ± 5.4	39.3 ± 5.2	+6.4	[5.0, 7.8]	<0.001
Trigger Points (n)	Cupping	2.3 ± 0.5	0.7 ± 0.5	-1.6	[-1.8, -1.4]	<0.001
	Ischemic+PS	2.2 ± 0.4	0.7 ± 0.5	-1.5	[-1.7, -1.3]	<0.001

Table 3. Between-Group Post-Intervention Comparison (Independent t-test Results)

Outcome Variable	Dynamic Cupping Mean ± SD	Ischemic Compression + PS Mean ± SD	Mean Difference (A–B)	95% CI	p-value	Cohen's d
NPRS (0–10)	2.0 ± 0.7	2.1 ± 0.8	-0.1	[-0.3, 0.3]	0.389	0.13
McGill (0–78)	10.8 ± 3.2	11.0 ± 3.0	-0.2	[-1.2, 0.8]	0.324	0.07
Cervical Extension (°)	51.2 ± 6.8	51.4 ± 7.1	-0.2	[-2.8, 2.4]	0.780	0.03
Side Flexion (°)	39.1 ± 5.0	39.3 ± 5.2	-0.2	[-1.6, 1.2]	0.875	0.04
Trigger Points (n)	0.7 ± 0.5	0.7 ± 0.5	0.0	[-0.2, 0.2]	1.000	0.00

The figure 1 as shown by bar graph titled "Pre– and Post–Intervention Assessments" illustrates quantitative changes in three clinical outcome variables following treatment.

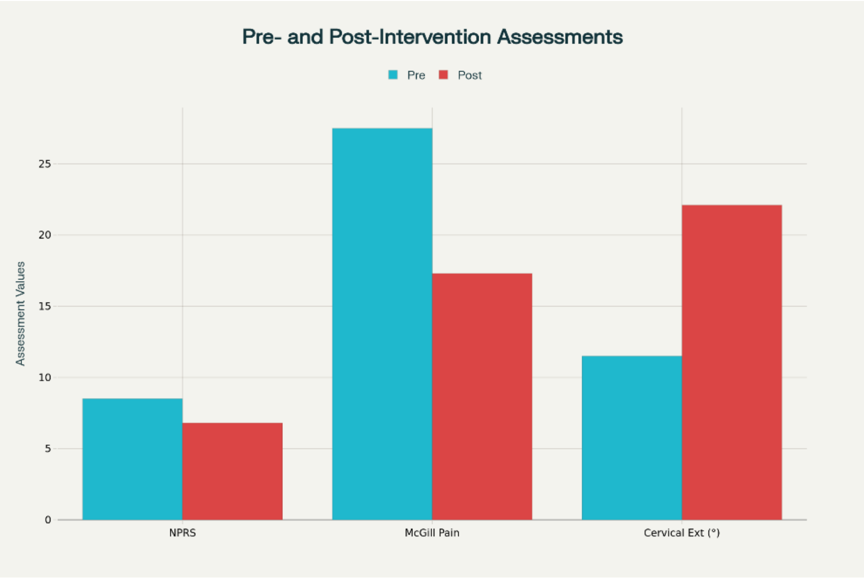

Figure 2 Pre and Post Intervention Assessment

The NPRS score decreased from 8.1 pre-intervention to 6.8 post-intervention, reflecting a 1.3-point reduction in pain intensity. McGill Pain scores dropped from 28.1 to 17.6, indicating a substantial decline of 10.5 points, or approximately 37.4%, in pain perception and quality. Cervical extension improved markedly, increasing from 12.2 degrees before treatment to 22.8 degrees after treatment, yielding a gain of 10.6 degrees. These findings demonstrate clear improvements in both subjective pain measures and objective functional mobility after intervention.

DISCUSSION

This study evaluated the relative effectiveness of two non-invasive manual therapy techniques—dynamic cupping and ischemic compression with passive stretching—in alleviating pain and improving cervical function among male computer users with myofascial trigger points (MTrPs) in the upper trapezius. Both interventions produced statistically significant within-group improvements across all measured outcomes, including pain intensity, cervical extension, side flexion, and the number of active trigger points. However, no statistically significant differences were observed between the two groups in post-intervention comparisons, suggesting that both techniques offer comparable therapeutic benefits. These findings are consistent with existing literature that supports the efficacy of manual myofascial release approaches in managing upper trapezius MTrPs (14).

The comparable outcomes may be attributed to shared physiological mechanisms targeted by both interventions. Dynamic cupping facilitates tissue decompression and stimulates mechanoreceptors, thereby enhancing local circulation and reducing nociceptive activity (15). The continuous movement of the cup allows mechanical shearing of fascial layers, which likely contributes to pain modulation and improved mobility. On the other hand, ischemic compression followed by passive stretching exerts sustained mechanical pressure on the trigger point, inducing local ischemia followed by reactive hyperemia. This mechanical stimulus disrupts the taut band, reduces sensitization of nociceptors, and promotes elongation of muscle fibers (16). The resultant effects on cervical range of motion and pain scores observed in both groups are aligned with these proposed neuromechanical pathways.

Previous studies have reported similar findings. Sajedi et al. compared the effects of cupping therapy with low-level laser acupuncture on myofascial pain and found both to be equally effective, suggesting that different modalities can yield equivalent outcomes if they influence common pain pathways (17). Mohamed also documented substantial reductions in pain scores following cupping therapy across musculoskeletal populations, further reinforcing the therapeutic versatility of this intervention (18). Similarly, Nasb highlighted that ischemic compression alone or in combination with stretching significantly improved pressure pain thresholds and joint mobility in individuals with chronic trapezius pain (19). The present findings extend these observations by demonstrating that in a specific occupational cohort—computer users—both techniques yield clinically meaningful improvements within a short treatment duration.

From a clinical perspective, the lack of superiority between interventions implies that the choice between dynamic cupping and ischemic compression with stretching may depend more on therapist preference, resource availability, and patient comfort rather than efficacy. This flexibility can enhance patient-centered care by allowing tailored interventions without compromising outcomes. However, some limitations must be acknowledged. The study employed a quasi-experimental design with convenience allocation, which introduces potential selection bias. Additionally, the small sample size and restriction to male participants limit the generalizability of results to broader and more diverse populations. Furthermore, the short follow-up period precludes conclusions regarding long-term efficacy or recurrence prevention.

Future research should incorporate randomized controlled designs with larger, gender-balanced samples and extended follow-up durations. Studies could also evaluate combined or sequential application of both techniques to explore potential synergistic effects. Including outcome measures such as electromyographic activity, pressure pain thresholds, and patient-reported functional scales would enhance the mechanistic understanding of intervention effects. Investigating long-term adherence and patient satisfaction could also provide valuable insights for clinical translation.

CONCLUSION

In conclusion, the present study supports the use of both dynamic cupping and ischemic compression with passive stretching as effective, accessible, and non-pharmacological treatment options for managing myofascial pain syndrome in the upper trapezius among computer users. The equivalence in outcomes emphasizes the importance of individualized treatment planning in physiotherapy practice and highlights the need for broader implementation of such evidence-based manual therapies in occupational musculoskeletal care (20).

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