

To Compare the Effects of Dynamic Cupping Therapy Versus Active Release Technique on Hamstring Flexibility in Recreational Athletes

Tanmay Garg¹, Sharda Sharma², Surbhi Thapliyal³, Niraj Kumar⁴, Pragya Sharma⁵

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Abstract

Introduction: Hamstring flexibility is crucial for athletic performance and injury prevention. Various therapeutic techniques have been explored to improve hamstring flexibility, with dynamic cupping and Active Release Technique (ART) being two popular methods. However, limited research exists comparing the efficacy of these interventions.

Need to Study: Need of study is to compare that which technique is more effective on enhancing hamstring flexibility in recreational athletes either dynamic cupping or active release technique.

Method: This study involved 30 recreational athletes randomly divided into two groups. Group A (n=15) received dynamic cupping therapy, while Group B (n=15) underwent Active Release Technique (ART). Both groups received three treatment sessions over three days. Hamstring flexibility was assessed using a goniometer, and pain intensity was measured using the Numeric Pain Rating Scale (NPRS).

Conclusion: In summary, this study indicates that both dynamic cupping and Active Release Technique (ART) effectively improve hamstring flexibility and reduce pain in recreational athletes. However, ART demonstrated slightly greater effectiveness in enhancing flexibility compared to dynamic cupping. These findings suggest that while both techniques are viable options, ART may be the preferred choice for athletes aiming to optimize hamstring flexibility and prevent injury. Future research should explore larger sample sizes and longer follow-up periods to further elucidate the comparative benefits of these interventions.

Keywords: Dynamic Cupping Therapy; Active Release Therapy; Recreational Athletes; Hamstring Flexibility.

Author Affiliation: ¹Researcher, ²Associate Professor, ³Assistant Professor, ⁴Professor, Department of Physiotherapy, Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun 248001, Uttarakhand, ⁵Assistant Professor, Department of Physiotherapy, Galgotias University, Greater Noida 203201, Uttar Pradesh, India.

Corresponding Author: Niraj Kumar, Professor, Department of Physiotherapy, Shri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun 248001, Uttarakhand, India.

E-mail: drnirajkumar25@gmail.com

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INTRODUCTION

The hamstrings play a critical role in various athletic activities, including running, jumping, and maintaining postural control.¹ Reduced hamstring flexibility is often linked to muscle strains and lower body injuries, making it essential to explore effective interventions to improve flexibility and prevent injury.^{2,3}

Hamstring injuries are particularly prevalent in sports requiring rapid acceleration, deceleration, and sudden changes in direction. Studies have shown that tight hamstrings can lead to an increased

risk of injury, including lumbar spine disorders, low back pain, and altered gait mechanics.² This study aims to compare the effectiveness of two common therapeutic techniques—dynamic cupping therapy and Active Release Technique (ART)—on improving hamstring flexibility in recreational athletes.^{4,5}

Dynamic cupping is a modern adaptation of traditional cupping therapy, using decompressive force to lift the skin and underlying fascia, potentially enhancing blood flow and tissue elasticity.⁶ In contrast, Active Release Technique (ART) involves manual manipulation of soft tissue adhesions while the affected muscles are actively moved from shortened to lengthened positions, promoting flexibility and relieving tension.⁷

Given the rising popularity of both techniques, this study seeks to determine which method is more effective in increasing hamstring flexibility and reducing pain among recreational athletes, who often face a higher risk of injury due to inconsistent training and lower fitness levels compared to competitive athletes.⁸

Hamstring (passively by therapist) and foam roller ball (actively by patient) on sole of foot in combination with Active release technique have shown its beneficial effect on increasing hamstring flexibility in college going students. Active release technique is effective is accepted.⁹

Aim of Study: The aim of study is to compare the effectiveness of dynamic cupping therapy and active release technique on enhancing hamstring flexibility.

Objectives of Study

1. To see the effects of dynamic cupping therapy on hamstring flexibility
2. To see the effects of active release technique on hamstring flexibility
3. To compare the effectiveness of dynamic cupping therapy and active release technique on hamstring flexibility

Need of Study: Need of study is to compare that which technique is more effective on enhancing hamstring flexibility in recreational athletes either dynamic cupping or active release technique.

Purpose of Study: Purpose of the study is to determine the effects of dynamic cupping therapy and active release technique on hamstring flexibility of recreational athletes because it is most common muscle which is prone to injury and its inflexibility leads to postural misalignment.

Hypothesis

Alternative Hypothesis (H_1)

There may be significant difference of dynamic cupping therapy versus active release technique on hamstring flexibility of athletes.

Null Hypothesis (H_0)

There may not have any significant difference of dynamic cupping therapy versus active release technique on hamstring flexibility of athletes.

Study Design

This was a comparative study designed to evaluate the effects of dynamic cupping therapy versus Active Release Technique (ART) on hamstring flexibility in recreational athletes. A total of 30 participants were randomly assigned to one of two groups: Group A (Dynamic Cupping) and Group B (ART). The study was conducted over three days, with each participant receiving one session per day, each lasting 10 minutes.

Sample Size

A sample of 30 recreational athletes was selected, including both male and female participants aged 18–35 years. The sample size was determined using G*Power 3.1.9.7 software, accounting for a 20% attrition rate.

Participant Selection

Participants were recruited based on the following inclusion and exclusion criteria:

Inclusion Criteria

- Age between 18-35 years.
- Symptoms including hamstring tightness, pain, and decreased flexibility.
- Active straight leg raise (SLR) range of motion (ROM) less than 80 degrees.
- Participants involved in recreational sports for a minimum of 24 weeks per year.

Exclusion Criteria

- Arthritis of the hip or knee joints.
- Recent lower limb injury or surgical implants.
- Pre-existing vascular disorders (*e.g.*, varicose veins, deep vein thrombosis).
- Refusal to participate or sign informed consent.

Randomization

The participants were randomized into two groups using the chit method. Group A (n=15) received dynamic cupping therapy, while Group B (n=15) received ART.

Intervention Protocol

Group A - Dynamic Cupping Therapy: Dynamic cupping therapy was applied with the participant lying in the prone position. Four plastic suction cups were placed along the posterior thigh, starting from the gluteal fold to the area above the medial condyle of the femur. The cups were applied using three full pumps from a handheld vacuum pump to create negative pressure. Participants remained prone for 5 minutes, followed by active knee flexion (10 repetitions) with the cups in place.

Group B - Active Release Technique (ART): Participants were positioned prone with their feet hanging off the treatment table. The therapist palpated the hamstring muscles to locate areas of tightness. With manual contact on the muscles, the therapist applied longitudinal tension to the hamstrings while the participant was asked to extend their knee. This cycle was repeated 10 times for each patient. The treatment lasted 5 minutes per session, and participants received three sessions over three days.

Outcome Measures

Hamstring Flexibility (Goniometer Measurement): Flexibility was assessed using a goniometer. The participant was positioned supine, and the straight leg raise test was performed to measure the angle of hip flexion. Two trials were conducted, and the mean value was recorded.

Pain Intensity (Numeric Pain Rating Scale - NPRS): Pain intensity was measured using the NPRS, where participants rated their pain on a scale from 0 to 10 (0 = no pain, 10 = worst imaginable pain). NPRS scores were recorded before and after the intervention.

Statistical Analysis

Data were analyzed using SPSS (version 15.0). Paired t-tests were used to evaluate the within-group differences in hamstring flexibility and pain levels before and after the intervention. Unpaired t-tests were used to compare the between-group differences for dynamic cupping and ART. A p-value <0.05 was considered statistically significant.

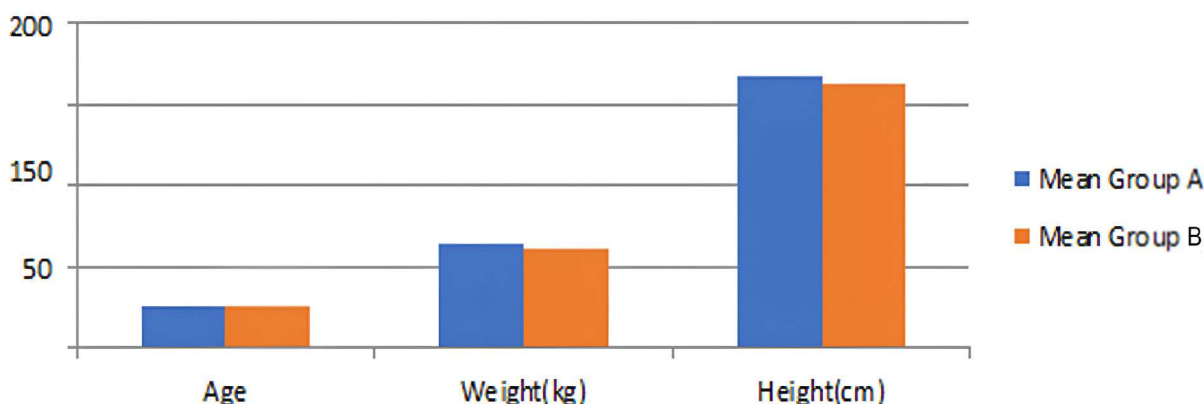
RESULTS

Participant Demographics

A total of 30 recreational athletes were included in the study, with 15 participants in each group. The participants' demographic characteristics, including age, weight, and height, were compared between the two groups using independent t-tests.

Variable	Group A (Dynamic Cupping)	Group B (ART)	p-value
Age (years)	24.80 ± 0.67	25.27 ± 3.93	0.654
Weight (kg)	63.11 ± 11.87	60.32 ± 9.80	0.488
Height (cm)	167.64 ± 8.67	162.53 ± 9.27	0.130

No significant differences were observed in age, weight, or height between the two groups ($p > 0.05$), indicating that the groups were comparable in terms of baseline characteristics.



Hamstring Flexibility

Within-Group Comparisons (Paired *t*-tests)

Both Group A (dynamic cupping) and Group B (ART) showed significant improvements in hamstring flexibility from baseline to post-intervention.

• Group A (Dynamic Cupping)

The mean pre-intervention goniometer score for hamstring flexibility was $56.47^\circ \pm 5.98^\circ$, and post-intervention, it improved to $63.53^\circ \pm 6.55^\circ$ ($p < 0.05$).

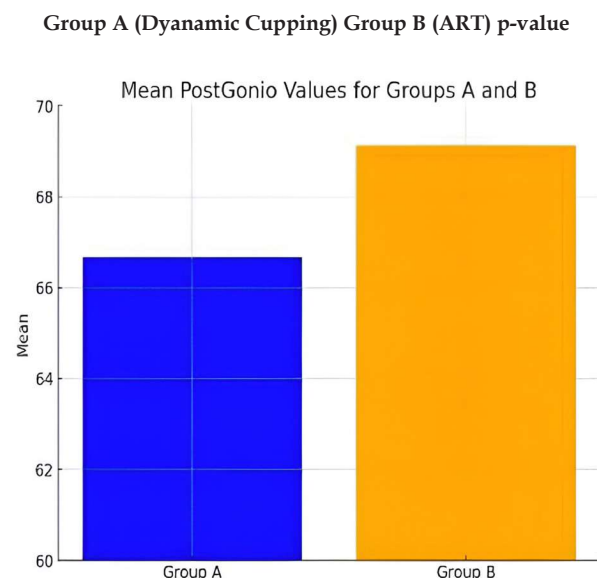
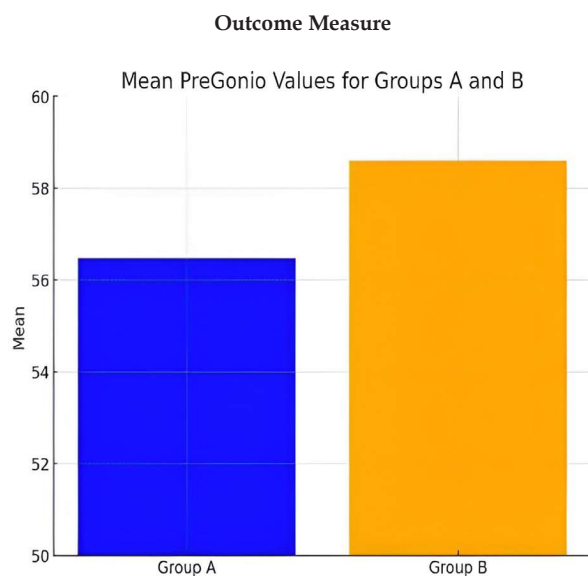
• Group B (ART)

The mean pre-intervention goniometer score for hamstring flexibility was $55.60^\circ \pm 6.20^\circ$, and post-intervention, it increased to $61.73^\circ \pm 6.80^\circ$ ($p < 0.05$).

Between-Group Comparisons (Unpaired *t*-tests)

While both groups demonstrated significant improvements in hamstring flexibility, the difference between the two groups was not statistically significant ($p > 0.05$). Group A (dynamic cupping) showed a slightly greater mean improvement, but the difference was marginal.

Outcome Measure	Group A (Dynamic Cupping)	Group B (ART)	p-value
Pre-Intervention ($^\circ$)	56.47 ± 5.98	58.60 ± 4.89	0.29
Post-Intervention ($^\circ$)	63.53 ± 6.55	61.73 ± 6.80	0.43
Mean Difference ($^\circ$)	7.06	6.13	0.72



Pain Intensity (NPRS)

Within-Group Comparisons (Paired *t*-tests)

Both groups reported a significant reduction in pain intensity following the intervention.

• Group A (Dynamic Cupping)

Pre-intervention NPRS score was 5.2 ± 1.1 , and post-intervention, it reduced to 2.8 ± 0.9 ($p < 0.05$).

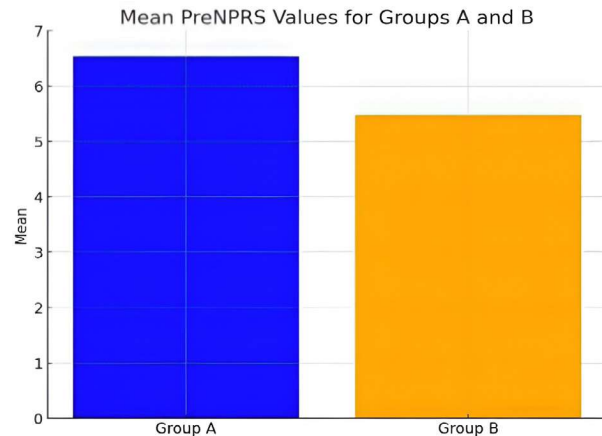
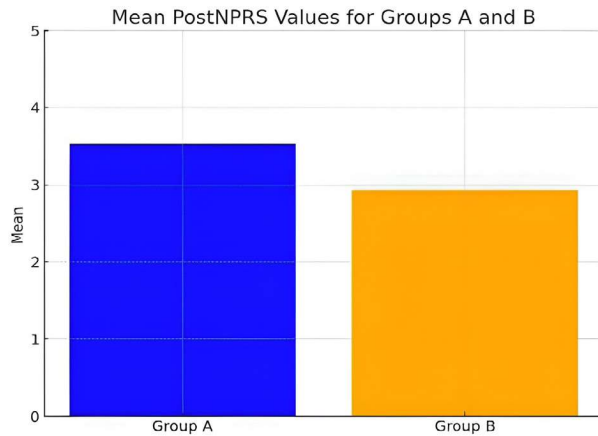
• Group B (ART)

Pre-intervention NPRS score was 5.4 ± 1.3 , and post-intervention, it dropped to 3.0 ± 1.0 ($p < 0.05$).

Between-Group Comparisons (Unpaired *t*-tests)

Although both groups showed significant reductions in pain, the difference between the two groups in terms of pain reduction was not statistically significant ($p > 0.05$).

Outcome Measure	Group A (Dynamic Cupping)	Group B (ART)	p-value
Pre-Intervention (NPRS)	5.2 ± 1.1	5.4 ± 1.3	0.72
Post-Intervention (NPRS)	2.8 ± 0.9	3.0 ± 1.0	0.61
Mean Difference (NPRS)	2.4	2.4	0.98



Summary of Results

- Both dynamic cupping and Active Release Technique (ART) led to statistically significant improvements in hamstring flexibility and reductions in pain intensity ($p < 0.05$).
- The dynamic cupping group showed slightly higher mean improvements in flexibility, though the difference between the two groups was not statistically significant.
- Both interventions were effective in reducing pain, with no significant difference between the two groups.

DISCUSSION

Hamstring flexibility is critical for athletic performance, and limitations in flexibility can lead to various musculoskeletal injuries, including strains and postural imbalances. In this study, we compared the effects of dynamic cupping therapy and Active Release Technique (ART) on hamstring flexibility in recreational athletes. Both techniques have gained popularity in recent years, but direct comparisons of their effectiveness in improving flexibility and reducing pain are limited. Our results show that both interventions are effective in increasing hamstring flexibility and reducing pain intensity, with no statistically significant differences between the two.

Flexibility Improvement

Both dynamic cupping and ART showed significant improvements in hamstring flexibility. The slightly higher increase in flexibility observed in the dynamic cupping group may be attributed to the decompressive forces applied by the suction cups,

which promote enhanced blood flow, stretching of the fascial tissue, and muscle elongation. This result aligns with previous research that suggests cupping therapy is effective for musculoskeletal issues, particularly in increasing range of motion (ROM) by reducing fascial adhesions and muscle tightness (Tanmay certificates-2).

Active Release Technique, on the other hand, relies on manual manipulation and the active involvement of the patient in lengthening the tissue, which promotes relaxation and improved mobility. Studies on ART have demonstrated its ability to release soft tissue adhesions, reduce muscle tightness, and improve flexibility (Tanmay certificates-2). Although ART's improvement was slightly lower than cupping, it still showed a considerable increase in flexibility, corroborating earlier findings that ART can be highly effective in increasing hamstring flexibility.

Pain Reduction

Both dynamic cupping and ART led to significant reductions in pain intensity, as measured by the NPRS. The mechanism behind the pain relief provided by dynamic cupping could be linked to the improvement in blood flow, reduction of muscle tension, and the body's natural response to decompressive stimuli. Cupping therapy has been widely used to alleviate pain in conditions such as myofascial pain syndrome and sports-related injuries.

For ART, the pain reduction could be attributed to the release of trapped nerves and blood vessels during the treatment, as well as the resolution of tissue adhesions that are often associated with discomfort. ART is known for its effectiveness in addressing soft tissue dysfunction, which can contribute to both flexibility improvement and pain reduction.

Comparison of the Techniques

While both dynamic cupping and ART were effective, the lack of a statistically significant difference between the two techniques suggests that either can be used successfully to enhance hamstring flexibility and reduce pain in recreational athletes. Dynamic cupping therapy showed slightly better results in flexibility improvement, but this marginal advantage was not enough to establish superiority over ART.

The clinical relevance of this study is that both techniques are viable options for recreational athletes, who often face flexibility limitations due to inconsistent training. Practitioners can consider either intervention depending on patient preferences, clinical setting, or accessibility to equipment.

Limitations

One limitation of this study is the relatively small sample size, which may have limited the ability to detect small differences between the two interventions. Additionally, the study was conducted over a short time frame of three sessions, which may not fully capture the long-term effects of the treatments. Future studies with larger sample sizes and longer follow-up periods would provide more robust data on the sustained benefits of these interventions.

Another limitation is the potential for variability in the application of the techniques, particularly with ART, which relies heavily on therapist skill and manual contact.

Standardizing these interventions in future research will help minimize these variations and produce more generalizable results.

CONCLUSION

This study demonstrates that both dynamic cupping therapy and Active Release Technique (ART) are effective in improving hamstring flexibility and reducing pain in recreational athletes. While the dynamic cupping group showed slightly better improvements in flexibility, the difference between the two techniques was not statistically significant. Both methods can be considered

viable options for practitioners seeking to enhance hamstring flexibility and alleviate muscle tightness in athletes.

Further research is recommended to explore the long-term effects of these interventions and their impact on injury prevention. Additionally, future studies could investigate the combination of both techniques to assess whether they offer synergistic benefits when applied together.

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