

A Comparative Analysis of Cupping Therapy and Static Stretching for Hamstring Tightness Among Gym Enthusiasts

Raja Shailin¹, Dr. Himadri Nimavat², Dr. Kalpesh Vasani³

¹BPT (from Shri D M Patel College of Physiotherapy, Amreli, Gujrat, India.)

²MPT (Rehabilitation), Assistant Professor, Shri D M Patel College of Physiotherapy, Amreli, Gujarat, India.

³MPT (Musculoskeletal Conditions and Sports), Principal in Charge, Shri D M Patel College of Physiotherapy, Amreli, Gujrat, India.

Corresponding Author: Raja Shailin

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ABSTRACT

Introduction: Muscle tightness referred to the sensation of increased tension or stiffness in the muscles. Cupping therapy was specifically used to decompress adhesions and scar tissue, relax muscle spasms, decrease trigger point pain, and reduce inflammation following trauma. Stretching involved physical exercises that placed body parts in various positions to lengthen and elongate muscles, thereby enhancing flexibility. The study aimed to compare the effects of cupping therapy and static stretching on hamstring tightness in gym enthusiasts.

Aim: To evaluate and compare the effects of cupping therapy and static stretching on hamstring tightness in gym enthusiasts.

Method: After obtaining ethical approval, divided the eighty-eight gym enthusiasts with hamstring tightness into two groups. Group A received cupping therapy three times a week for one week, which included both static and dynamic cupping combined with 10 repetitions of active knee flexion. Group B performed static stretching of the hamstring muscles for three consecutive days over one week. Pre and post assessments were conducted using the hip 90-90 straight leg raise (SLR) test.

Result: A paired sample t-test revealed significant improvements in both groups: Cupping Therapy ($p = 0.000$) and Static Stretching ($p = 0.000$). An unpaired t-test showed extremely significant difference between the both groups ($p < 0.001$).

Conclusion: Both cupping therapy and static stretching effectively reduced hamstring tightness, but cupping therapy demonstrated superior results.

Keywords: Hamstring tightness, Cupping Therapy, Static Stretching, Hip 90-90 SLR (straight leg raising) test.

INTRODUCTION

Tightness is a restricted motion due to adaptive shortening of soft tissue. It is an adaptive shortening of the contractile and noncontractile elements of muscle. Tightness is caused by the Immobilization,

Pain, Joint Effusion, Sedentary life style, Paralysis, Muscle Imbalances and Postural Malalignment.[1] The incidence of hamstring tightness manifests prominently among athletes participating in contact sports, athletic martial arts, swimming,

weightlifting, volleyball, baseball, hockey, cricket, and tennis. [2-5]

The cupping therapy has been used in China since thousands of years. At first time it was applied using cattle horn; to create a negative pressure inside the horn, fire was ignited to expel the air. Eber's papyrus who has written a medical book, had described cupping therapy in 1550 BC. It is used specifically to increasing blood circulation, decompress adhesions and scar tissue, relax muscle spasm, decrease pain, increasing skin temperature, reduced blood pressure, improve neurophysiological performance, decrease inflammation. Cupping therapy encompasses various technical approaches, each serving distinct purposes. The initial type, known as dry or static cupping, involves the application of cups to the skin with negative pressure generated within them. This vacuum effect is achieved through different means such as heating with fire, manual pumping, or electric suction. [6-10] Practitioners typically leave these cups in place on the skin for duration of 3 to 10 minutes.[11] Dynamic cupping, the second type, incorporates the application of oil to the skin before moving cups with gentle suction over the targeted massage area. Various techniques are utilized within dynamic cupping, including gliding methods such as longitudinal, cross-fiber, and circular movements. [6,7,9,10,12] Dynamic cupping is beneficial for improving hip and Knee ROM. [13] furthermore, cupping therapy categorizes suction intensity into three levels: weak, medium, and strong. Weak cupping involves performing half to one full manual pump suction, while medium cupping entails one to two full manual pump suction. Strong cupping utilizes two or more full pump suction to achieve the desired effect. Each approach within cupping therapy serves specific therapeutic objectives, ranging from relaxation to stimulation and blood circulation enhancement. [6,7,9,10,12]

Static stretching is a form of flexibility exercise that involves holding a position for

an extended position, to elongate and relax specific muscle groups. This type of stretching has several benefits. Firstly, it enhances the range of motion in the joints, allowing for greater flexibility and mobility. Secondly, it helps to alleviate stiffness and discomfort in the muscles, promoting relaxation and ease of movement. static stretching facilitates increased circulation to the muscles, which can aid in the delivery of oxygen and nutrients while also helping to remove waste products, thereby reducing the recovery period after exercise and promoting overall muscle health and performance. The duration of static stretch can be based on the patient's tolerance and response during the stretch. [1,14] Static stretching is most common and traditional type of stretching. This can be performed passively by a partner or actively by subject. Stretching is a commonly used by athletes, rehabilitation patients, older adult and who participating in fitness program. [15,16,17] Static stretching is an effective method to increase hamstring flexibility and ROM and is considered safer than ballistic stretching. [18,19] A thirty second hold, three times a day for three days in week is sufficient duration for increasing the flexibility. [20-23]

The 90-90 Straight Leg Raise (SLR) test is a physical assessment used to evaluate the flexibility and strength of the hamstrings and hip flexors. In this test, the individual lies flat on their back with grasp the leg behind knees with both hands to stabilize the hips at 90 degrees of flexion and actively extends each knee in turn as much as possible. For normal flexibility in hamstrings, knee extension should be within 20 degrees of full extension. [11,24-26]

Need of this study is to compare the effect of cupping therapy and static stretching on hamstring tightness in gym enthusiasts. By determining the effect of cupping therapy and static stretching in treating hamstring tightness, healthcare professionals can make informed decisions when designing treatment plans for patients with similar conditions, the study empowers individuals

to make informed decisions about their health and fitness routines.

Aim of the study is to evaluate and compare the effects of cupping therapy and static stretching on hamstring tightness in gym enthusiasts. This comparison seeks to ascertain which method offers more significant benefits in terms of increasing ROM and decreasing discomfort or stiffness in hamstring muscle.

MATERIALS & METHODS

The study design was classified as a comparative study. Convenience sampling with simple random allocation was used to select participants. The study population included participants who engaged in strength training. The sample size consisted of 60 participants. The study was conducted at Samarth Vyayam Mandir (AKHADO) in Amreli. The source of data collection was also Samarth Vyayam Mandir (AKHADO) in Amreli. The treatment duration was set for one week, while the overall study duration spanned over six months.

The inclusion criteria required that participants willingly participated, were between the ages of 18 and 27 years, were physically active (attending a minimum of 3 sessions per week for at least 30 minutes per session), and had a minimum of 2 months of experience in strength training. The exclusion criteria included individuals with physical handicaps, those who had past injuries (such as strains or sprains) within the last six months, individuals with severe cardiopulmonary diseases, those with recent fractures (where bone union was incomplete), individuals with hypermobility of the knee, those with open wounds, individuals with hernias, and those with inflammatory conditions or infections. [1,6,27-29]

PROCEDURE

After obtaining ethical approval from Shree D M Patel College of Physiotherapy, Amreli ethical committee, recruited participants were provided with a written informed consent form before participation. They were explained the purpose, methods, and rights as participants in the study. The participants were included in the study according to the inclusion criteria and excluded according to the exclusion criteria. After that, the participants underwent a detailed physiotherapy assessment, which was the baseline assessment for hamstring tightness by the Hip 90-90 SLR test. Following this, the participants were divided into two groups.

Group A (Cupping Therapy) began with skin sanitization, followed by the application of oil to facilitate smooth movement of the cups. Dynamic cupping was performed for four minutes, succeeded by static cupping for seven minutes along the hamstring muscle. This was complemented by ten repetitions of active knee flexion with the cups in place. Post-treatment, the cups were sanitized and cleaned, and the entire regimen was repeated thrice a week for one week. [6,30-32] (Fig. 1)

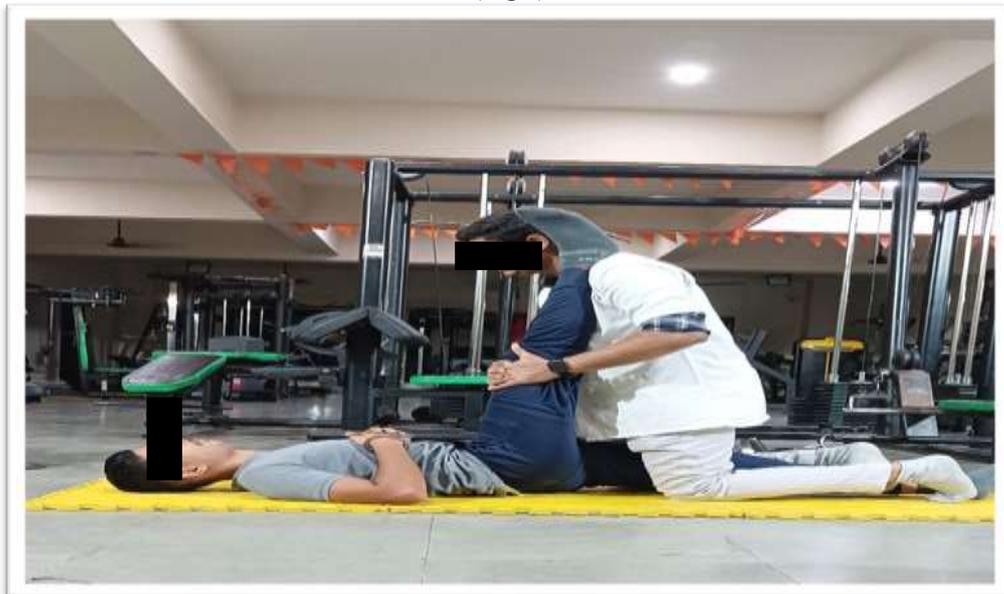
Group B (static stretching) participants were subjected to a regimen of hamstring stretching, executed in three sets of 30 seconds each, spanning over three consecutive days in a week for one week. [1,20,21] (Fig. 2)

The re-evaluation for both treatment groups was conducted using the hip 90-90 SLR test to measure any improvement in the range of motion. [11,24-26] (Fig.3)

(Fig.1)



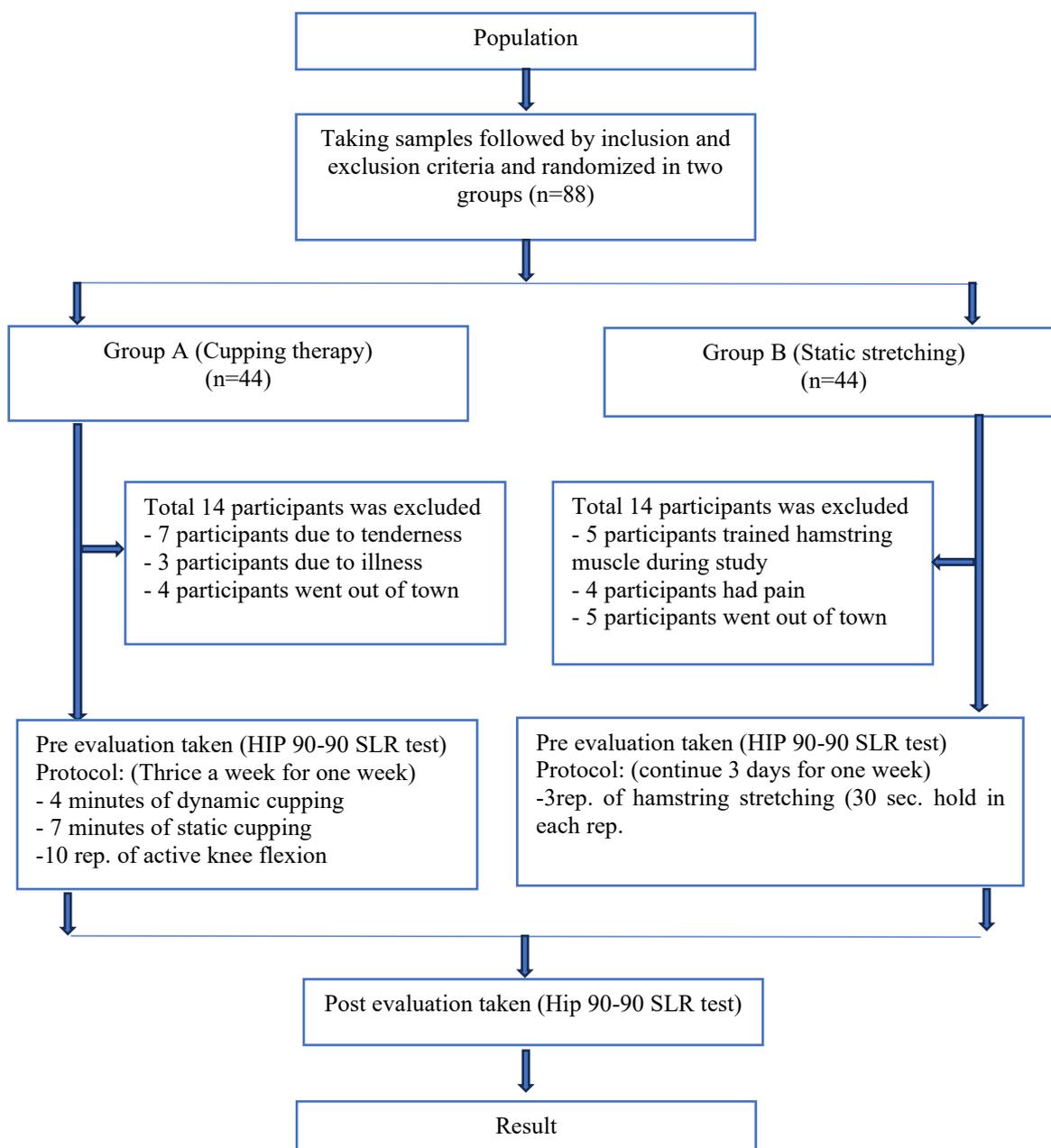
(Fig.2)



(Fig.3)



Chart 1: Allocation chart



STATISTICAL ANALYSIS

SPSS version 25.0 was used to analyze the data. The confidence interval was set at 95%, and statistical significance was accepted at $p < 0.05$. Following the normality testing of the data using the Shapiro-Wilk test, the data were found to follow normal distribution, so that the parametric tests were selected. For within-group analysis, the paired t-test was used, and for between-group analysis, the unpaired t-test was used.

RESULT

A total of eighty-eight ($n=88$) samples were collected from the population, excluding twenty-eight ($n=28$) samples due to various reasons during the study. To analyze the efficacy of cupping therapy (Group A) and static stretching (Group B), paired sample t-tests were used. Additionally, unpaired t-tests were utilized to compare the treatment outcomes between the two groups. **(Chart 1)**

For Group A ($n=30$) **(Table 1 & Graph 1)**, which received cupping therapy, the paired

sample t-test revealed a significant improvement ($t = -10.470$, $p = .000$) from pre-treatment (Mean = 144.70, SD = 7.866) to post-treatment (Mean = 155.07, SD = 7.777) (Graph 3). Similarly, for Group B ($n=30$) (Table 2 & Graph 2), which underwent static stretching, the paired sample t-test showed a significant enhancement ($t = -9.648$, $p = .000$) from pre-treatment (Mean = 142.60, SD = 5.568) to post-treatment (Mean = 149.60, SD = 7.504) (Graph 4). (Table 3)

When treatment outcomes between the two groups were compared using an unpaired t-test, both groups displayed similar pre and post treatment means and standard deviations. Upon data analysis, the t-value was ($t = 2.771$) with a p-value of ($p <$

0.001), indicating an extremely significant difference between the groups (Graph 5). (Table 4)

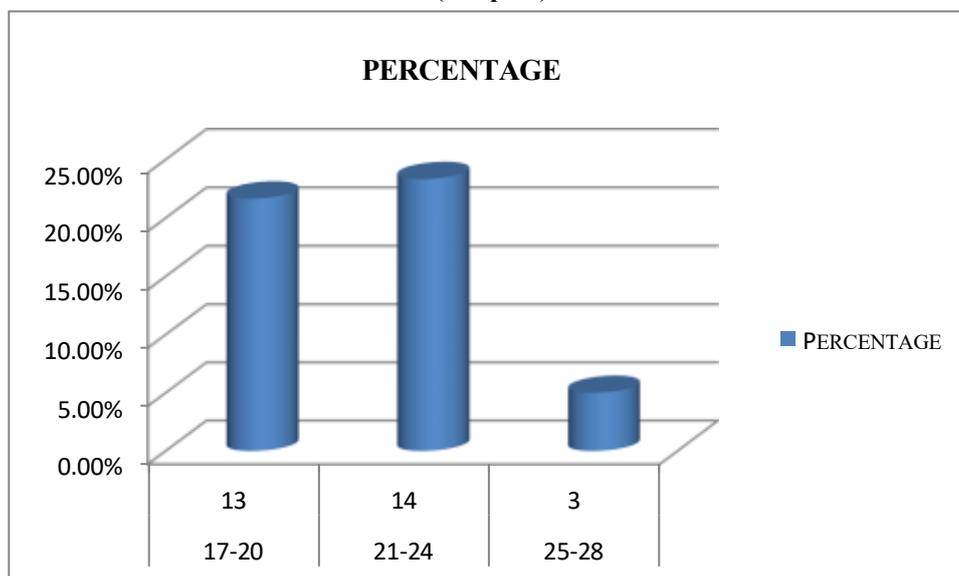
The findings demonstrated that both cupping therapy and static stretching significantly improved knee extension range of motion (ROM). However, when comparing the two treatments, cupping therapy (Group A) proved to be significantly more effective than static stretching (Group B). These results highlighted the importance of considering various treatment modalities when designing intervention strategies for hamstring tightness.

Age of participants

(Table 1)

Age	No. of participants	%
17-20	13	21.66%
21-24	14	23.22%
25-28	3	5%

(Graph 1)



Gender of the participants

(Table 2)

Gender	No. of people	%
Male	52	86.66%
Female	8	13.33%

(Graph 2)

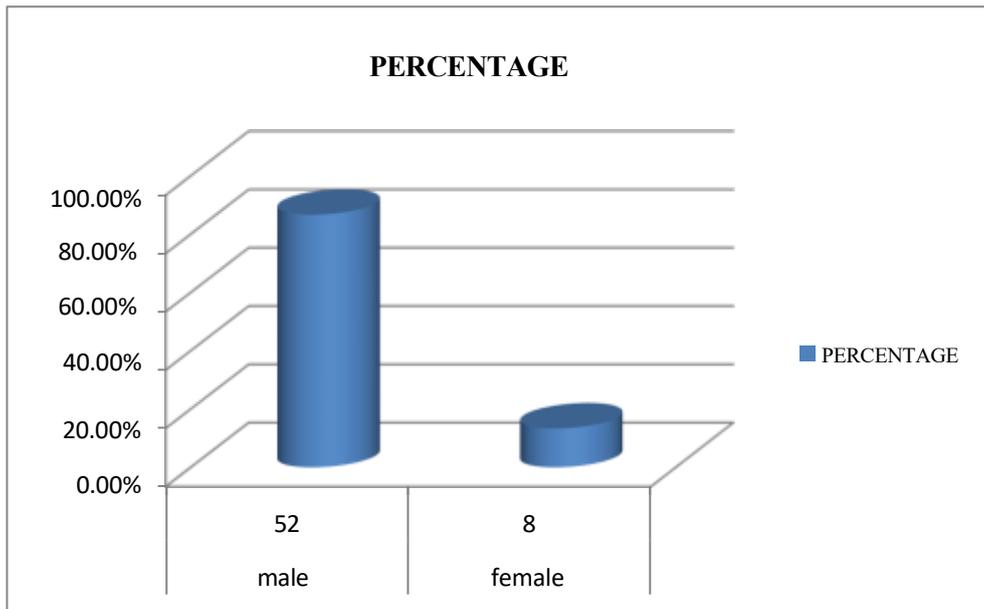


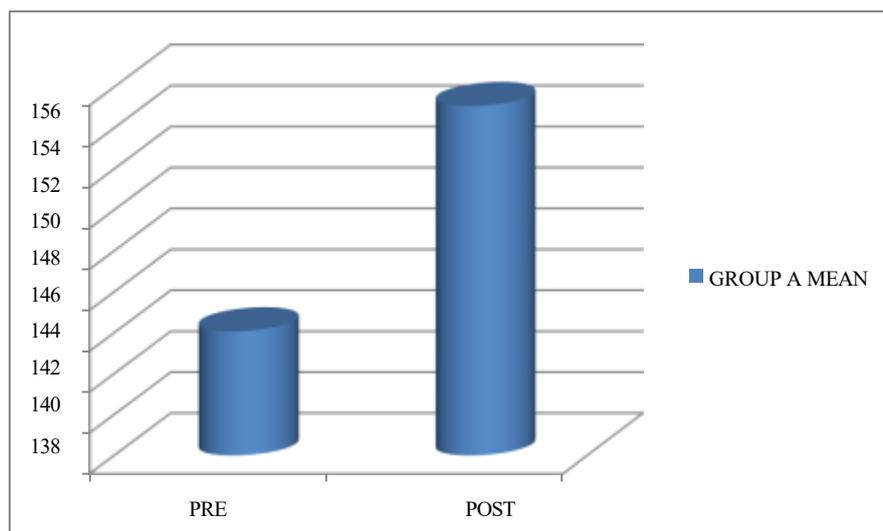
Table 3: Pre and Post Mean and SD in knee extension ROM in within group, using paired sample t test

GROUP	MEAN		SD		T	P	RESULT
	PRE	POST	PRE	POST			
A	144.7	155.07	7.866	7.777	-10.47	.000	significant
B	142.6	149.6	5.468	7.504	-9.648	.000	significant

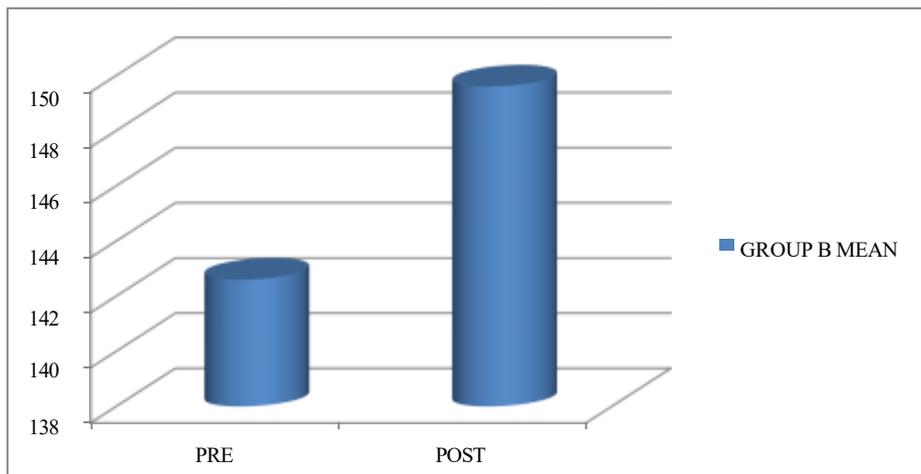
Table 4: Comparison of mean difference in knee extension ROM between both the groups, using unpaired sample t test

GROUP	SAMPLE SIZE	MEAN DIFFERENCE	T	P	RESULT
A	30	10.37	2.771	<0.001	Extremely significant
B	30	7			

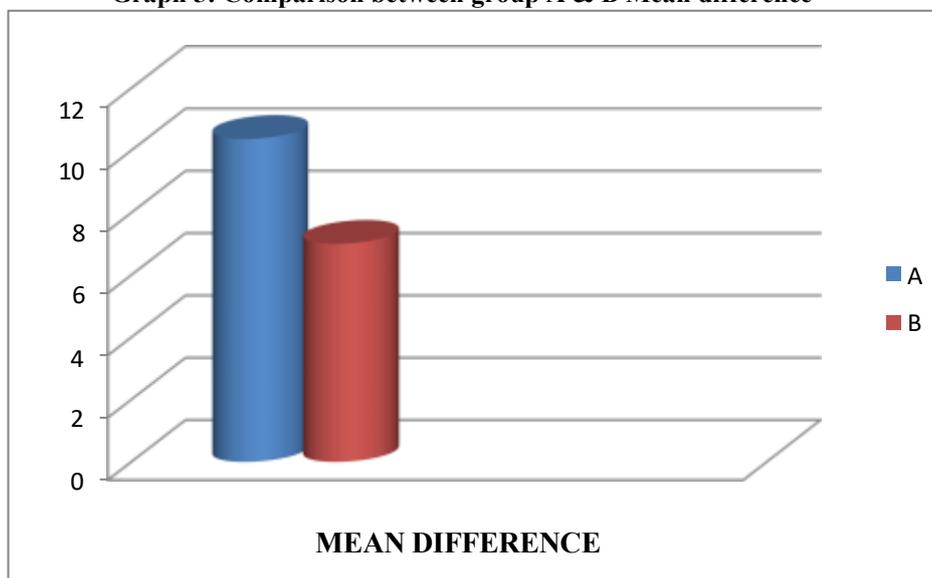
Graph 3: Improvement in hamstring flexibility in Group A



Graph 4: Improvement in hamstring flexibility in Group B



Graph 5: Comparison between group A & B Mean difference



DISCUSSION

Cupping therapy was purported to enhance blood circulation, alleviate pain, eliminate toxins from the body, and stimulate the immune system. This was achieved through the application of suction, which created a negative pressure within the cup. As a result, blood rushed into the area beneath the cup, promoting increased blood circulation that permeated down to the muscle layer. This heightened circulation facilitated the rapid repair of cells in the affected area. Furthermore, cupping therapy was associated with the augmentation of granulation and angiogenesis processes, which involved the formation of new connective tissue and blood vessels respectively, particularly during the healing

of wounds. Cupping therapy held potential in the treatment of soft tissue injuries, the relief of muscle tension, and the mitigation of pain. The nitric oxide (NO) theory of cupping therapy suggested that the suction created by cupping stimulated the release of NO in the body. NO was a signaling molecule that played a role in vasodilatation. By increasing NO levels, cupping therapy may have enhanced blood circulation, which could have helped alleviate muscle tightness and promoted healing. Cupping therapy was purported to alleviate pain through various mechanisms. One explanation suggested that cupping might have elevated the pain threshold in the treated area. Another theory, known as counter irritation, posited that discomfort

caused by cupping diminished the sensation of pain from the original source. Additionally, cupping was believed to activate acupuncture points, which were renowned for their pain-relieving effects. Moreover, cupping therapy facilitated pain alleviation by unraveling adhesions within the muscle or fascia, thereby reducing muscular tension and inducing relaxation. Additionally, cupping aided in pain mitigation by promoting the circulation of blood to stagnant regions of the skin and muscle, concurrently expelling metabolic waste such as lactic acid from the muscular tissue. Furthermore, empirical evidence indicated that cupping effectively purged impure blood from afflicted areas, which may have harbored inflammatory mediators, degraded cellular components, coagulated blood, scar tissue, or other nociceptive agents impeding the healing process. Cupping therapy facilitated the enhancement of the immune system through a multifaceted process. Initially, it induced localized inflammation, thereby prompting the release of inflammatory chemicals. This cascade of events served to attract white blood cells to the targeted area and activated the complement system. Consequently, the synergy between antibodies and white blood cells was bolstered, amplifying their efficacy in combating both microbes and damaged cells. Furthermore, cupping therapy was shown to elevate the levels of tumor necrosis factor (TNF) and interferon, pivotal signaling proteins that played instrumental roles in the body's defense against pathogens and aberrant cells. Through these mechanisms, cupping therapy served as a modality for fortifying the body's immune response, contributing to overall wellness and resilience. [6,7,9,10,12] A combination of static and dynamic cupping gave beneficial results for improving extensibility. [32] Stretching referred to a broad category of therapeutic actions aimed at enhancing the flexibility of soft tissues. These involved techniques intended to lengthen structures that had shortened adaptively and had lost

mobility over time. When a rapid or continuous stretching force was applied to a muscle-tendon unit, the primary and secondary afferent fibers within the intrafusal fibers detected these alterations in length. These afferent signals then interacted with alpha motor neurons located in the spinal cord, prompting the activation of extrafusal muscle fibers. This physiological response was termed the stretch reflex, characterized by an augmentation or enhancement of active tension within the stretched muscle. This heightened tension served to oppose elongation and was believed to impede the efficacy of the stretching process. [1]

Additionally, when the stretch reflex was triggered in a lengthened muscle, there may have also been a reduction in activity (inhibition) within the muscle on the opposing side of the joint, a phenomenon known as reciprocal inhibition. To mitigate the activation of the stretch reflex and the ensuing rise in muscle tension, a gradual, low-intensity, prolonged stretching regimen was deemed preferable to a rapid, short duration stretch. The Golgi tendon organ (GTO) exerted an inhibitory influence on the level of muscle tension within the muscle-tendon unit it occupied, particularly during prolonged stretching. This effect was termed autogenic inhibition. The GTO's inhibition of the contractile elements of the muscle was believed to contribute to reflexive muscle relaxation during stretching maneuvers, facilitating the elongation of the muscle against reduced tension. Therefore, when a gentle, slow stretching force was applied to the muscle, the stretch reflex was less likely to be activated, as the GTO fired and suppressed muscle tension, allowing the parallel process to occur. Static Stretching involved gradually elongating soft tissues just beyond their resistance point and maintaining this extended position with a consistent stretching force. [1] It was widely recognized for enhancing flexibility and range of motion (ROM) and was generally

considered safer than ballistic stretching. [18,19]

The results of this study evaluated the effectiveness of cupping therapy and static stretching in improving hamstring flexibility within each group. Both interventions resulted in significant improvements. Additionally, when comparing both treatment outcomes, cupping therapy showed a significant difference compared to static stretching, indicating its superiority in improving hamstring flexibility among gym enthusiasts.

Static stretching increase ROM by mechanical stress to induced length adaptations, while cupping therapy works by activating acupuncture points, the effects of which are not limited to muscle but may expand to fascia, there by it may provide greater increase in ROM.

CONCLUSION

The research findings indicate that both cupping therapy and static stretching are effective treatments for reducing hamstring tightness. However, when comparing these two methods, cupping therapy demonstrates superior result in reducing hamstring tightness among gym enthusiasts.

Declaration by Authors

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