

# Effectiveness of Cupping Therapy Versus Myofascial Release (MFR) in Reducing Gastrocnemius Muscle Tightness in High Heels Users – A Comparative Study

<sup>1</sup>Arpita A Pawar

<sup>2</sup>Dr. Varsha A Kulkarni

Head of Neurology Department, Professor of Neuro-Physiotherapy, LSFPEF's College of Physiotherapy, Nigdi, Pune- 411044.

## Abstract:-

### ➤ *Background*

Walking is the most common form of human locomotion. From a motor control perspective difficulty of walking is the use of high heeled shoes. The use of high heels is widespread in modern society in professional and social contexts. An increase in heel height forces the foot, leading to injuries. Cupping therapy has already been used in various health conditions These applications may result in local stretching, releasing the muscle and decreasing local stiffness. Myofascial release technique (MFR) has been applied to the rehabilitation treatment of musculoskeletal injuries it helps reduce fibrous adhesion, MFR is whole body, hand on approach for evaluation and treatment of the human structure its focus facial system.

### ➤ *Aim*

To assess the effectiveness of dynamic cupping versus myofascial release (MFR) for patient with gastrocnemius muscle tightness and to find out if there is an improvement in ankle dorsiflexion ROM.

### ➤ *Method*

The study involves 100 females with gastrocnemius muscle tightness and use high heels on daily basis, cupping therapy was given to RT leg and myofascial release(MFR) was given to LT leg in same person for 3 sessions with 1day interval in between every session and assessed post interval of both groups.

### ➤ *Result*

The result showed cupping therapy and myofascial release(MFR) both are effective in reducing muscle tightness but cupping therapy shown immediate effect in reducing muscle tightness (mean value 13.7) than MFR (mean value12.5)(p value 0.004).

### ➤ *Conclusion*

Cupping therapy is more beneficial than myofascial release(MFR) in reducing gastrocnemius muscle tightness.

**Keywords:-** Cupping Therapy, Myofascial Release(MFR), Gastrocnemius Muscle, High Heels.

## I. INTRODUCTION

Walking is the most common form of human locomotion. From a motor control perspective difficulty of walking is the use of high heeled shoes. The use of high heels is widespread in modern society in professional and social contexts. Literature showed that wearing high heels can produce injurious effects on several structures from the toes to the pelvis.<sup>(14)</sup> which alter the natural position of the foot-ankle complex.<sup>(16)</sup> An increase in heel height forces the foot, leading to injuries such as fracture and ankle sprain<sup>(17,18)</sup> long term use of high heels has been found to shorten medial gastrocnemius muscle fascicles and increase Achilles tendon stiffness.<sup>(12)</sup> Gastrocnemius and soleus are the major muscles. Gastrocnemius is large powerful muscle in the lower limb as well as it is two joint muscle, it run through knee joint to ankle joint.<sup>(9)</sup> The gastrocnemius muscle-tendon unit is essential to human locomotion. It supplies the main propulsive force of walking.<sup>(10)</sup>

Loss of joint range of motion (ROM) is a common dysfunction in physically active people and may be a predisposition to musculoskeletal injury. Numerous factors can contribute to loss of ROM, including poor flexibility, previous injury, and immobilization. The Silfverskiold test was performed as part of the patient's physical examination. A goniometer was used to measure the amount of dorsiflexion that was obtained with test. The maximal amount of ankle dorsiflexion with the knee extended was measured and recorded. The test was performed with the knee in full extension.<sup>(4)</sup> Cupping therapy has already been used in various health conditions such as reducing tightness and improve range of motion of the joint and in low back pain. It involves the application of glass, bamboo, ceramic or acrylic cups, which can be manually, automatic and self-removal, thus causing negative pressure in the subcutaneous tissues. There are various application forms (dry cupping, wet cupping, massage cupping) different suction strengths and the application time is usually 5–10 min. These applications may result in local stretching, releasing the muscle and decreasing local stiffness, and the

onset of ecchymosis usually disappears in up to 10 days.<sup>(1)</sup> Myofascial release technique (MFR) has been applied to the rehabilitation treatment of musculoskeletal injuries such as neck pain, low back pain, scapulohumeral periarthritis and functional ankle instability, and the clinical application and related experiments of MFR show an increasing trend. The current study found that MFR helps reduce fibrous adhesion, MFR is whole body, hand on approach for evaluation and treatment of the human structure its focus facial system.<sup>(2)</sup>

➤ *Need of Study*

Wearing high heels and doing work like prolong standing, prolong walking can sometimes cause foot pain because of high heels many women compromise their health and to prevent this loss we are conducting this study.

➤ *AIM*

To assess the effectiveness of dynamic cupping versus myofascial release (MFR) for patient with gastrocnemius muscle tightness and to find out if there is an improvement in ankle dorsiflexion ROM.

**II. METHODOLOGY AND MATERIAL**

Study design: Experimental study, Study set up: PCMC, Sampling size: Purposive sampling, Sample size: 100, Study duration: 6 month, Vacuum cup set 2.5 diameter and 1.8 diameter, pen, notepad, timer, half circle goniometer, moisturizer.

➤ *Procedure*

Ethical approval was taken from ethical committee. Subject was selected as per the inclusion and exclusion criteria. Participants were explained about the study and written and signed consent were taken from the concerned participants. Equipment was sanitize thoroughly The silfverskiold test was performed on both leg to check the tightness of the muscle. The pre ankle dorsiflexion ranges was taken of both leg by goniometer. Subject was taken in prone position to apply cupping on 1 leg and MFR on other leg. The body part was sanitized and moisturized and applied dynamic cupping for 5 minutes after application immediately ankle dorsiflexion range was taken by the goniometer. Same procedure done for other leg, 5 minutes MFR was applied on other leg and immediate ankle dorsiflexion range was taken after application 48 hours rest was given to the subject after the 1<sup>st</sup> session. Applied the same procedure of two sessions by giving 1 day gap in between every session. At the end of the three sessions post ankle dorsiflexion ranges were noted.

**III. RESULT AND DATA ANALYSIS**

Table 1 Shows Number of Sample Size that was Taken Mean Difference and Standard Deviation of all Session of Two Groups.

	1 <sup>st</sup> pre MFR	1 <sup>st</sup> post MFR	2 <sup>nd</sup> post MFR	3 <sup>rd</sup> post MFR	1 <sup>st</sup> pre cupping	1 <sup>st</sup> post cupping	2 <sup>nd</sup> post cupping	3 <sup>rd</sup> post cupping
N	100	100	100	100	100	100	100	100
Mean	12.3	12.5	13.1	14.3	12.3	13.7	16.2	18.3
Standard deviation	2.87	2.86	2.76	2.74	2.86	3.10	2.74	1.85

➤ *Paired T Test*

Table 2 shows the result of paired t test which has applied to the groups.as result of paired t test shows that all values of both groups are <0.05 which reject the null hypothesis and indicates that there is significant variation in pre and post results.

			statistic	df	p	Mean difference	SE difference
1st pre MFR	1st post MFR	Student's t	3.23	99.0	0.002	-0.200	0.0620
	2nd POST MFR	Student's t	6.99	99.0	<.001	-0.790	0.1131
	3rd POST MFR	Student's t	15.20	99.0	<.001	-1.980	0.1303
1st pre cupping	1st POST CUPPING	Student's t	9.56	99.0	<.001	-1.460	0.1527
	2nd POST CUPPING	Student's t	22.86	99.0	<.001	-3.930	0.1719
	3rd POST CUPPING	Student's t	28.72	99.0	<.001	-6.000	0.2089

As  $p < 0.05$ , we reject null hypothesis. It indicates that significant variation in pre and post results.

➤ *One way Anova for MFR Group*

Table 3 shows the result of one way anova test which has been applied to MFR group and suggestive of p value <0.001 indicates there is significant difference in post MFR readings when compare to previous ranges.

	Level	N	Mean	SD	SE
MFR Reading	1st post MFR	100	12.5	2.86	0.286
	2nd POST MFR	100	13.1	2.76	0.276
	3rd POST MFR	100	14.3	2.74	0.274
		F	df1	df2	p
MFR Reading		10.6	2	198	<.001

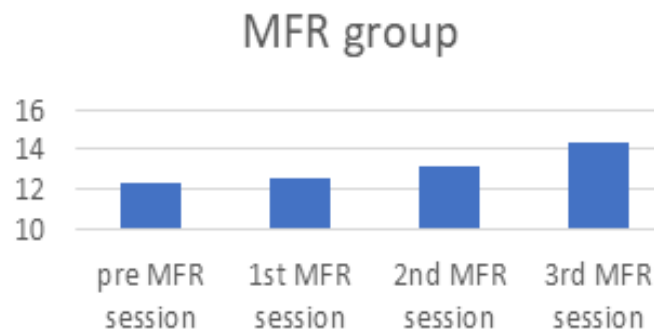


Fig 1 MFR Group  
Y axis - Mean value X axis - MFR result

➤ *Post Hoc Test MFR Group*

Interpretation: As  $p < 0.01$ , there is significant difference in post MFR reading

Table 4 shows the result of post hoc test which has applied to MFR group which shows that there is significant difference in every session of MFR reading.

		1st post MFR	2nd POST MFR	3rd POST MFR
1st post MFR	Mean difference	—	-0.590	-1.78
	p-value	—	0.293	<.001
2nd POST MFR	Mean difference	—	—	-1.19
	p-value	—	—	0.008
3rd POST MFR	Mean difference	—	—	—
	p-value	—	—	—

Interpretation: There is significant difference in 1<sup>st</sup> and 3<sup>rd</sup> 2<sup>nd</sup> and 3<sup>rd</sup> MFR reading.

➤ *One way Anova for Cupping Therapy Group*

Table 6 shows result of post hoc test which has been applied to cupping therapy group which indicates that there is significant difference after every session cupping reading.

Group	Level1	N	Mean	SD	SE
Cupping Reading	1st POST CUPPING	100	13.7	3.10	0.310
	2nd POST CUPPING	100	16.2	2.74	0.274
	3rd POST CUPPING	100	18.3	1.85	0.185
		F	df1	df2	p
Cupping Reading		82.8	2	188	<.001

Interpretation: As  $p < 0.01$ , there is significant difference in post cupping reading

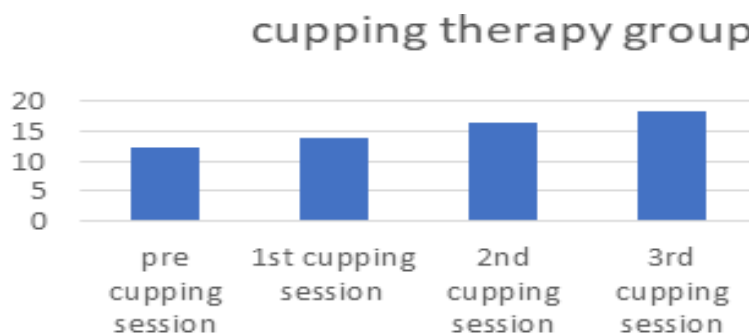


Fig 2 Cupping Therapy Group  
Y axis – Mean value X axis - cupping therapy result

➤ Independent Samples T Test

Table 7 shows the result of independent sample t test of immediate cupping therapy session and MFR session, and suggestive p value 0.004 indicates that there is significant difference between this two groups.

1 <sup>st</sup> post result	Group	N	Mean	Median	SD	SE
1st MFR Cupping Reading	1st POST CUPPING	100	13.7	13.5	3.10	0.310
	1st post MFR	100	12.5	12.0	2.86	0.286
1 <sup>st</sup> post result		Statistic		Df	p	
1st MFR Cupping Reading	Student's t	2.92		198	0.004	

Interpretation: There is significant difference in 1<sup>st</sup> MFR and Cupping reading.

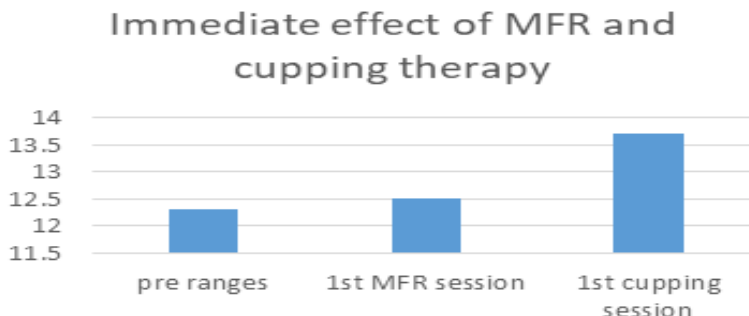


Fig 3 Immediate effect of MFR and cupping therapy  
Y axis – Mean value X axis - immediate result of MFR and cupping therapy

➤ Independent Samples T Test

Table 8 shows the result of independent sample t test of long term effect of cupping therapy and MFR session and suggestive p value <.001 indicates that there is significant difference between this two groups.

3 <sup>rd</sup> post result	Group	N	Mean	Median	SD	SE
3 MFR , Cupping Reading	3rd POST CUPPING	100	18.3	18.0	1.85	0.185
	3rd POST MFR	100	14.3	14.0	2.74	0.274
3 <sup>rd</sup> post result		Statistic		df	p	
3 MFR Cupping Reading	Student's t	12.1 a		198	<.001	

Interpretation: There is significant difference in 3<sup>rd</sup> MFR and Cupping reading.

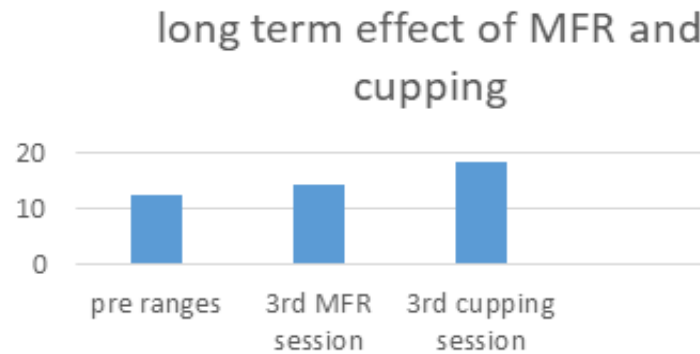


Fig 4 Long Term Effect of MFR and Cupping

Y axis – Mean value X axis - long term effect of MFR and cupping therapy result

#### IV. DISCUSSION

The purpose of this study is to evaluate the effectiveness of the dynamic cupping therapy and MFR to reduce gastrocnemius muscle tightness in high heel users. To do, the study involves 3 sessions of treatment of cupping therapy and MFR.

Cupping is performed by applying cups to selected skin points and creating a sub atmospheric pressure, either by heat or by suction. The main proposed mechanisms of action were effects of sub atmospheric pressure suction, promoting peripheral blood circulation, and improving immunity.

Felix J Saha, Stefan\_Schumann The Effects of Cupping Massage in Patients with Chronic Neck Pain - A Randomised Controlled Trial their study Reported that effects of cupping therapy include promotion of the skin's blood flow changing of the skin's biomechanical properties increasing pain thresholds, improving local metabolism reducing muscle stiffness and inflammation.<sup>(7)</sup>

F.J. Saha, S. Schumann, H. Cramer, C. Hohmann, K.E. Choi, R. Rolke, *et al.* studied the effects of cupping massage in patients with chronic neck pain-a randomised controlled trial their study reported that there is improvement in flexibility of muscle after the cupping therapy treatment

Iwona Sulowska-Daszyk Agnieszka Skiba The Influence of Self-Myofascial Release on Muscle Flexibility in Long-Distance Runners studied that Myofascial release (MFR) is a form of manual therapy that involves the application of a low load, long duration stretch to the myofascial complex, intended to restore optimal length, decrease pain, and improve function. and helps reduce restrictions or adhesions within layers of the fascial tissue. The overloading forces may also be transferred by the myofascial system, leading to tissue overload, repetitive strain injuries and resulting restrictions in muscle flexibility Due to increased muscle flexibility after applying the SMFR technique.<sup>(8)</sup>This suggested that there is effect of cupping therapy and MFR to reduce gastrocnemius muscle tightness but cupping therapy has immediate effect in reducing muscle tightness because cupping massage may include increases in local microcirculation, thus decreasing the

hypersensitivity due to muscle spasm-related ischemia in the muscles and Other hypotheses include effects on the peripheral nociceptor or at the spinal cord.<sup>(8)</sup> Which is suggestive of cupping therapy is more beneficial than MFR.

And study shows that there was immediate improvement in ankle dorsiflexion ROM after giving cupping therapy treatment.

Mean value 13.7 of 1<sup>st</sup> session of cupping and mean value 12.5 of 1<sup>st</sup> session of MFR suggested that cupping therapy has showed better result than MFR. Mean value 16.2 of 2<sup>nd</sup> session of cupping and mean value 13.1 of 2<sup>nd</sup> session of MFR suggested that cupping therapy has showed better result than MFR. Mean value 18.3 3<sup>rd</sup> session of cupping therapy and mean value 14.3 3<sup>rd</sup> session of MFR suggested that cupping therapy has showed long term effect also than MFR. All three values of cupping therapy session has shown more immediate and better result than MFR. And there were improvement of ankle dorsiflexion ROM after every session of cupping therapy compare to MFR.

Hence it is proven that cupping therapy gives better result than MFR to reduce gastrocnemius muscle tightness in high heels users.

#### V. CONCLUSION

The study shown that cupping therapy and myofascial release (MFR) both are beneficial in reducing muscle tightness but statistical analysis shows there is immediate effect of cupping therapy in improving ankle dorsiflexion ROM and reducing gastrocnemius muscle tightness.

Hence it is statistically concludes that cupping therapy is more beneficial in reducing gastrocnemius muscle tightness in high heel users.

##### ➤ Clinical Implication

Cupping therapy has shown qualitative results in reducing muscle tightness hence it can be use for the same.

##### ➤ Recommendations and Scope of Study

- Study can be done on larger population.
- Study duration can be longer to check the long term effect of the cupping therapy.

- Study can be conducted on people with chronic gastrocnemius muscle tightness.
- Study can also be done on subjects with muscle tightness to check the pain threshold during the dynamic cupping session.

### REFERENCES

- [1]. Hugo Jário de Almeida Silva Bruno T Saragiotto Dry cupping in the treatment of individuals with non-specific chronic low back pain: a protocol for a placebo-controlled, randomised, double-blind study 2019; 9(12)
- [2]. myofascial release book – John F. Barnes<sup>5</sup>
- [3]. David A Goss, Jr. Joseph Long Clinical Implications of a One-hand Versus Two-hand Technique in the Silfverskiöld Test for Gastrocnemius Equinus 2020 Jan; 12(1)
- [4]. Justin Stanek Taylor Sullivan Comparison of Compressive Myofascial Release and the Graston Technique for Improving Ankle-Dorsiflexion Range of Motion 2018 Feb;53(2):160-167.
- [5]. Alexander M. Zöllner Jacquelynn M. Pok On high heels and short muscles: A multiscale model for sarcomere loss in the gastrocnemius muscle 2016 Jan 21
- [6]. Tamer S Aboushanab Saud AlSanad Cupping Therapy: An Overview from a Modern Medicine Perspective 2018 Jun;11(3):83-87
- [7]. Felix J Saha, Stefan Schumann, The Effects of Cupping Massage in Patients with Chronic Neck Pain - A Randomised Controlled Trial 2017;24(1):26-32.
- [8]. Iwona Sulowska-Daszyk Agnieszka Skiba The Influence of Self-Myofascial Release on Muscle Flexibility in Long-Distance Runners 2022 Jan 1;19(1):457.
- [9]. BD Chourasia's Human anatomy volume, seventh edition pg.no.116
- [10]. Erin E Butler Nathaniel J Dominy Architecture and functional ecology of the human gastrocnemius muscle-tendon unit 2016 Apr;228(4):561-8.
- [11]. M M Wiedemeijer E Otten Effects of high heeled shoes on gait. A review 2018 Mar;61:423-430
- [12]. Neil J Cronin Rod S Barrett Long-term use of high-heeled shoes alters the neuromechanics of human walking 2012 Mar;112(6):1054-8
- [13]. Tian-Tian Chang Zhe Li Effects of Self-Myofascial Release Using a Foam Roller on the Stiffness of the Gastrocnemius-Achilles Tendon Complex and Ankle Dorsiflexion Range of Motion 2021 Sep 17
- [14]. Enrica Di Sipio Giulia Piccinini Walking variations in healthy women wearing high-heeled shoes: Shoe size and heel height effects 2018 Jun;63:195-201
- [15]. Linh Y Nguyen Kelsey D Harris Increased knee flexion and varus moments during gait with high-heeled shoes: A systematic review and meta-analysis 2021 Mar;85:117-125
- [16]. Neil J Cronin The effects of high heeled shoes on female gait: a review 2014 Apr;24(2):258-63
- [17]. Hui-Lien Chien Tung-Wu Lu Control of the motion of the body's center of mass in relation to the center of pressure during high-heeled gait 2013 Jul;38(3):391-6
- [18]. Hui-Lien Chien Tung-Wu Lu Effects of long-term wearing of high-heeled shoes on the control of the body's center of mass motion in relation to the center of pressure during walking 2014 Apr;39(4):1045-50
- [19]. Meizi Wang Ci Jiang Health View to Decrease Negative Effect of High Heels Wearing: A Systemic Review 2021 Mar 12
- [20]. Yiyang Chen Jing Xian Li Influences of heel height on human postural stability and functional mobility between inexperienced and experienced high heel shoe wearers 2020 Oct 28