

## Original Article

# Effects of Stretching and Positional Release on Calf Muscle Pain in Post-Natal Females

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### Abstract

**Objective:** To determine the effects of stretching and positional release on calf muscle pain in postnatal females.

**Methodology** The quasi-experimental study was conducted on a sample of 40 subjects from October 2022 to February 2023 at Arif Memorial Teaching Hospital Lahore. Non probability sampling technique was used. These subjects were allocated non-randomly in Group A and Group B. Stretching was performed on subjects of group A and positional release was performed on group B. The groups were assessed before and after treatment by a numeric pain rating scale and ankle dorsiflexion Range, while SPSS V. 21 was used for pretest post-test comparison using paired sample t test at P value <0.05.

**Results:** The study comprised females with a mean age±sd of participants is 26.00±4.38 years. The pre and post values on Numeric pain rating scale were 8.00±1.28, 2.47±1.33 respectively. While the dorsiflexion angle pretest was 6.53±1.280 and post-test was 12.53±2.780. There was significant difference in pre and post values and p value ≤0.05, which show that the results were significant. Both stretching and positional release were effective for postnatal calf pain. But results showed that Stretching was more effective than positional release.

**Conclusion:** The study concluded that stretching is more effective in reducing calf muscle pain in post-natal females compared to positional release.

**Keywords:** Ankle dorsiflexion, Calf muscle tightness, Females, post-natal care, Positional release, Stretching, pain.

**How to cite:** Riaz A, Nazir S, Niazi R, Waheed A, Mahmood T, Ahmad N. Effects of Stretching and Positional Release on Calf Muscle Pain in Post-Natal Females. MedERA-Journal of CMH LMC and IOD. 2024; 6(1): 16-22

**DOI:** <https://doi.org/10.61982/medera.v6i1.131>

### Introduction

Postpartum is the time after childbirth when most

women get calf muscle pain after pregnancy.<sup>1</sup> The postnatal period is divided into three distinct but continuous phases: the acute phase, which lasts for six to twelve hours after birth, the sub-acute phase, which lasts for six weeks, and the delayed phase, which can last up to six months. The postpartum period begins after childbirth and is usually thought to end within six weeks. Calf muscle cramps and pain a common symptoms in the postnatal period of pregnancy.<sup>2</sup> It occurs in about half the pregnant

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Submission Date: 18-01-2024  
1st Revision Date: 03-02-2024  
2nd Revision Date: 20-05-2024  
Acceptance Date: 06-06-2024

women and is characterized by tonic colonic involuntary contractions of the gastrocnemius muscles associated with severe pain.<sup>3</sup>

The mother's body undergoes numerous changes throughout pregnancy that last long till the birth.<sup>4</sup> Taking appropriate care of the mother following a vaginal delivery is crucial for both postpartum care and maintaining general health.<sup>5</sup> Women often complain of musculoskeletal pain. The lower back area is where discomfort is most frequently felt.<sup>6</sup> Also, many women experience pain in both upper and lower limbs due to various conditions.<sup>7</sup>

Non-specific calf pain, or discomfort in the calf region without a specific medical problem, is another prevalent complaint that affects women. To yet, nevertheless, not much research has been done to identify the cause of non-specific calf discomfort or how to treat it. Additionally, many women do not seek medical attention for the same discomfort because it is a self-limiting one.<sup>8</sup> Pregnancy causes all kinds of changes, including hyper tightness in the hip flexors, lower back, thighs, chest, shoulders (especially the muscles that raise the shoulder blades), and back of the neck.<sup>6,9</sup> It causes negative health effects on women before and after giving birth, such as postural deviation, incontinence, leg cramps, back discomfort, coccyx pain, and sacroiliac joint pain.<sup>5</sup> Previously studies have focused on myofascial release for low back pain.<sup>10</sup> and post-natal closed chain exercises for foot.<sup>11</sup> but calf muscle pain lacks the data. The significance of the study is that it will explain the effects of stretching and positional release on calf muscle pain in post-natal females. The results contribute to the growing body of knowledge regarding postnatal pain management and provide valuable insights for healthcare practitioners and researchers seeking effective interventions in this context.

Muscle cramps usually occur with a rapid increase of loading on an already shortened muscle. Disturbances in fluid and electrolyte balance make muscles

more susceptible to cramping. The same applies to energy losses after exhaustive exercising. Muscles kept in a shortened state for prolonged periods of time are more likely to cramp without previous loading.<sup>12</sup> The amount of force used for each stretching protocol is subjective. As a result, certain terms commonly appear throughout the studies when describing the amount of stretch to which an individual is subjected. For example, subjects are often instructed to continue the stretch to the point where 'tightness without pain' is experienced. Also, terms such as 'gentle stretch'.<sup>13</sup> The aim of the study was to determine the effect of stretching and positional release on calf muscle pain in postnatal females. This can help practitioners to educate the post-natal females to manage the calf muscle tightness themselves.

### Methodology

This Quasi-experimental study was conducted at Arif Memorial Hospital from October 2022 to February 2023 after ethical approval by the Institutional Review Board of Rashid Latif Medical College, Lahore (Ref. No IRB/2022/057). Non-probability convenient sampling approach was used to recruit post-natal females for the study. A sample size of 40 subjects was enrolled in the study. Sample size 40 was measured by using open epitool software assuming 5% level of significance with 0.90 power of study with following details using values of previous research: Two-sided test - Hypothesis test for a population mean Input task(s) = Two Level of significance (%) = 5 Power (1=0.90 Population standard deviation=1.37 Population variance ((2)=1.8769 Test value of population mean (o)=3.33 Anticipated population mean ((a)=4.03 Sample size group A=20 Sample size group B=20 total sample size (n)=40

The females included were healthy and had post-natal periods of acute phase and age between 20-30 years. The post-natal periods begins immediately

after the birth of the baby and extend up to 6 weeks (42 days) after birth. While females with pregnancy-induced conditions like gestational hypertension, polyhydramnios, bowel or bladder trauma, and neurological disease were excluded. These subjects were allocated in group A and group B by an assessor. Before being included in the non-randomized clinical trial, all patients signed an informed consent agreement and an independent assessor evaluated the subjects to avoid any selection bias. After group allocation on the patient's first visit, a detailed history and physical examination were conducted. Baseline measurements were taken among all the patients matching the inclusion criteria. Demographic data for each participant was taken.

The outcome was a Numeric pain rating scale used to evaluate pretest pain. The pain was rated by subjects from 0-10 presenting their condition. Before and after giving the intervention plan, calf tightness was assessed using active dorsiflexion actively.<sup>14</sup> To stretch the calf muscle position the female lying on the back with your hands stabilizing the knee place your other hand around the heel with your palm along the length of the foot and gently push the foot upwards with the knees straight ensure that the ankle doesn't roll in and out apply stretch using gentle pressure only. Do not stretch if female is resisting as there is a risk of injury to the joint. Stop if female is in pain. At baseline treatment hot pack was given to both groups for 10 minutes. The interventions were based on outpatient rehabilitation programs in both groups.

Group A was given stretching of calf muscles for 10-15 sec, two times per day each session was given for 10 minutes. Stretching was performed on subjects of group A and positional release was performed on group B. The techniques were performed for 4 weeks 2 times per day and each session was of 10 minutes. The total duration was 6 months. The patient placed the non-stretched leg forward while keeping the heel of the other leg on the floor. The patient shifted

the body weight on the forward leg until the feeling of mild discomfort arose. The knee of the stretched leg was kept extended for the gastrocnemius stretch.<sup>15</sup>

Group B was given the Positional Release of calf muscles for 5-10 seconds, two times per day. Each session was given for 10 minutes. The subject was in a prone lying position with the knee flexed to 90 degrees and the ankle plantar-flexed. The therapist applied deep manual pressure over the palpated trigger point and maintained it for 90 seconds. This procedure was repeated 3 times.<sup>16</sup> The patients were re-evaluated after 4 weeks of intervention and data was collected by same assessor. The data was first collected and analyzed using SPSS version<sup>21</sup>. The qualitative variables were presented in the form of frequency and quantitative data in the form of mean  $\pm$  sd. After fulfilling the parametric assumptions, data was distributed normally ( $p > 0.05$ ). The pretest-posttest comparison was made and mean difference was given, using a paired t-test at  $P \leq 0.05$ .

### Results

The study comprised females with a mean age  $\pm$  sd of participants is  $26.00 \pm 4.38$  years. BMI in group A was  $23.23 \pm 1.33$  kg/m<sup>2</sup> while in group B was  $24.17 \pm 2.24$  kg/m<sup>2</sup>, with equal distribution of participants in each group. (Table I)

The pre and post-values of Numeric pain rating scale were  $8.00 \pm 1.28$  and  $2.47 \pm 1.33$  respectively. Angle of

**Table I:** Demographics of Participants

Demographics	Group A (Stretching) N=20	Group B (Positional Release) N=20
BMI (Kg/m <sup>2</sup> )	23.23 $\pm$ 1.33	24.17 $\pm$ 2.24
Age (Years)	25.00 $\pm$ 3.28	26.00 $\pm$ 4.48

*BMI = Body mass index*

ankle dorsiflexion pretest was  $6.53 \pm 1.28$  degrees, while posttest was  $12.53 \pm 2.78$  degrees. There was a significant difference in pre and post-values and ( $p$  value  $\leq 0.05$ ) which shows that the result was signifi-



cant. Both stretching and positional release were effective for postnatal calf pain. But Stretching was more effective than positional release. (Table II)

There was a significant difference between the post-intervention numeric pain rating scores and ankle

**Table II:** Paired sample statistics for Pain and Ankle Dorsiflexion

Paired Samples Statistics						P-value*
Outcomes	Evaluation	N	Mean	Std. Deviation	Std. Error Mean	
Numeric pain rating scale	Pre- Intervention	40	8.00	1.28	0.20	0.013
	Post- Intervention	40	2.47	1.33	0.21	
Ankle Dorsiflexion in degrees	Pre- Intervention	40	6.53	1.28	0.24	0.000
	Post- Intervention	40	12.53	2.78	0.51	

*P-value was significant at <0.05*

dorsiflexion between both groups having a p-value of 0.000 which was less than 0.05. The group difference shows that stretching exercise was more effective compared to positional release. (Table III)

**Table III:** Between Group Comparison of pain and Calf Muscle tightness after treatment

Outcomes	Group	N	Mean difference	Std. Deviation	Std. Error Mean	P-value
Pain on NPRS	Group A	20	1.60	0.68	0.15	0.000
	Group B	20	3.35	1.26	0.28	
Ankle Dorsiflexion in degrees	Group A	20	10.01	0.91	0.24	0.000
	Group B	20	15.00	1.41	0.36	

*P-value was significant at ≤0.05*

### Discussion

The purpose of the present study was to check the effects of stretching and positional release on calf muscle pain in post-natal females. For this purpose, participants were randomly allocated into two groups i.e., Group A and Group B. Group A received stretching

and Group B received positional release NPRS (numeric pain rating scale) was used to evaluate the variables. After 6 weeks of study, it was concluded that stretching was most effective in reducing calf muscle pain among post-natal females. The effectiveness of both techniques was checked in reducing calf muscle pain and which technique is more effective in reducing calf muscle pain in post-natal females. Results of the present study showed that with 6 weeks of study, the stretching technique was more effective in reducing calf muscle pain. Stretching the muscles could stop cramps which brought on by either voluntary contraction or high-frequency stimulation of the peripheral nerve and stretched more successfully when they are heated vigorously with ultrasound because it makes the tissues more malleable.<sup>12</sup>

The study's findings demonstrated that while the Achilles tendon stiffness did not significantly improve following the foam roller treatment. In a current study, the authors examined the variation in hamstring muscle stiffness following a stretching regimen. We find a significant reduction in the average stiffness of the hamstring muscles five minutes after stretching.<sup>17</sup> Post-partum phase also known as post-natal phase is the period immediately after child birth and continues till 6 weeks. It has been reported that there is greater incidence of posterior pelvic tilt than low back pain in pregnant women which is one of the most common problem in terms of lost workforce, productivity and other related factors. The symptoms of low back pain usually worsen with muscle fatigue from static posture or as the day progresses. Causes such as increased level of circulating hormones.<sup>3</sup>

In contrast to another study, PNF sessions significantly reduced mean hamstring tightness, pain at rest, and pain during activity, and functional disability but positional release significantly reduced mean scores. While there was no significant difference between the two groups for Active Knee Extension

AKE (Lt) or pain at rest, there was a significant difference for AKE (Mean), pain during activity, and functional impairment. Over time, positional release and Proprioceptive Neuromuscular Facilitation (PNF Modified Hold Relax-MHR) both reduce pain and disability and increase hamstring flexibility, but PNF (MHR) is more beneficial than PR.<sup>18</sup> In current findings, significant differences in pain and calf tightness showed that the result was significant. But stretching was more beneficial compared to positional release showing that stretching can be an alternative intervention among females. A recent study has shown that leg cramps, pain, and heaviness are the most commonly reported symptoms that can persist. This can be managed using physical therapy intervention including exercise, and posture correction as well. This study emphasized the need for intervention during this period due to its beneficial effects.<sup>5</sup> The ankle dorsiflexion which is one of the types of exercise was used in the study that had beneficial outcomes for calf pain. Similarly study stated that calf muscle can be better managed with exercise.<sup>19</sup>

Stretching and Positional release technique has been proved separately to be effective in improving Hamstring muscle flexibility in previous studies. But there is limited study done comparing these two techniques i.e. stretching and PRT for the muscle tightness. Hence, the aim of present work is to study and compare the effectiveness of stretching technique and PRT on calf muscle pain in post-natal females.<sup>13</sup> This finding underscores the potential benefits of incorporating targeted stretching regimens as a preferred approach for managing postnatal calf muscle discomfort. This was quasi-experimental study and post-natal data was collected from single settings. Further large centre studies with randomization can increase the external validity of findings. Further, the study has limited variables of pain and calf muscle tightness only, while studies can be conducted for

quality of life, the activity of daily living, and other associated factors in the context of rehabilitation. It is recommended that further studies focus on other complications of Postnatal Females. It is possible to also consider other interventions to check the reduction of calf muscle pain in post-natal period. Stretching and Positional release technique has been proved separately to be effective in improving Hamstring muscle flexibility in previous studies. But there is limited study done comparing these two techniques i.e. stretching and PRT for the muscle tightness. Hence, the aim of present work is to study and compare the effectiveness of stretching technique and PRT on calf muscle pain in post-natal females.<sup>13</sup>

### Conclusion

The study concluded that stretching is more effective in reducing calf muscle pain in postnatal females as compared to positional release technique. This study demonstrated that stretching exercises exhibit greater efficacy in alleviating calf muscle pain and improving ankle dorsiflexion among postnatal females when compared to positional release techniques.

### Recommendations:

It is recommended that further studies focus on other complications of Postnatal Females. Other interventions may also be considered to reduce the calf muscle pain in post-natal period. Future researchers should take large samples from other cities as well.

**Acknowledgment:** We are thankful to Dr Hammad Latif, Department of Physical Therapy, Arif memorial Teaching Hospital for his assistance.

**Conflict of interest:** None

**Funding disclosure:** None

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#### Authors Contribution

**AR & SN:** Conceptualization and design of Project, literature search, Drafting and Revision.

**RN & AW:** Literature Search, Data Collection and Statistical Analysis.

**NA & TM:** Writing of Manuscript, Drafting, Revision and approval of the final draft.

Authors agree to be accountable for all aspects of work in ensuring that questions related to the accuracy or integrity of any part of the manuscript are appropriately investigated and resolved.