Original Article

Effectiveness of Calf Muscle Stretching Exercise on leg Cramps among Antenatal Mothers Attending a Tertiary Care Centre Thiruvananthapuram

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Abstract

Background: Leg cramps during pregnancy is a common discomfort characterized by involuntary, painful contraction of muscle groups that usually occur in the calf or small muscles of the foot but can affect different part of the leg. The severity of the leg cramp pain is variable and each attack may take few minutes.[1] The prevalence of leg cramps occurred among 30% to 50% of pregnant women. Leg cramping means painful spasm especially in the lower extremities occurs during pregnancy and mainly occurred in the second half of pregnancy typically occurs at night and usually lasts for a few seconds or 2 minutes.[2]

Materials and Methods: The objective of the present study was to assess the effectiveness of calf muscle stretching exercise on leg cramps among antenatal mothers. The research approach adopted for the study was quantitative approach and the research design was quasi experimental pre-test post-test control group design. Sample size was 80 and the samples who satisfied the inclusion and exclusion criteria were selected consecutively. Informed consent was obtained from those participants who were willing to participate in the study. The investigator collected socio demographic data, clinical data and history of leg cramps by a self- prepared semi structured questionnaire and intensity of leg cramps was assessed using numeric pain rating scale. The investigator demonstrated the stretching exercise and provided with a diary to note down the intensity, duration and frequency of leg cramps and the post-test was conducted after two weeks.

Results: The collected data was analyzed using SPSS version 22 and description of participants based on socio demographic data, clinical data and history of leg cramps were analyzed using percentage and frequencies and the effectiveness of calf muscle stretching exercise on frequency and duration of leg cramps among experimental and control group was analyzed using chi-square test and the calculated p value was <0.05, it was concluded that calf muscle stretching exercise was effective in reducing frequency and duration of leg cramps among experimental group also the effectiveness of calf muscle stretching exercise on intensity of leg cramps was analyzed by

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independent t-test. It was found that the mean difference in NPRS score in the experimental was 2.03±0.66 and in the control group was 0.35±1.14 and the calculated p value was <0.05.

Conclusion: calf muscle stretching exercise is effective in reducing intensity of leg cramps among antenatal mothers.

Key words: leg cramps; stretching exercise; antenatal mothers

Introduction

Leg Cramps is a musculoskeletal disorder characterized by suddenly occurring, episodic, persistently painful, involuntary contractions of the calf, hamstrings or foot muscles.[3] Discomforts during Pregnancy are quite common in second trimester when the musculoskeletal change occurs but do not significantly interfere with activities of daily living or pose any significant threat to the health of the mother or baby, in contrast to pregnancy complications.[3]

In India the prevalence of leg cramps is 64.6%. The prevalence of leg cramps in pregnant women in China affects the calf area, with a percentage of 32.9%, during the first trimester, the response is 11.6% in the second trimester, 51.2%, in last trimester.[4]

Muscle cramps usually occur with a rapid increase of loading of an already shortened muscle. Disturbances in fluid and electrolyte balance in muscles make them more susceptible to cramping. Muscles kept in a shortened for prolonged period of time are more likely to cramp without previous loading.[5]

A number of interventions are available for leg cramps in pregnancy. The most commonly used can be divided into categories like drug/ electrolyte/ vitamin therapies and the non – drug therapies which include muscle stretching, massage, relaxation, heat therapy and dorsiflexion of the foot.[6]

While treating muscle cramps others advice that when cramps occur, the patient should immediately massage and flex the affected muscle, alternatively, and stretching the calf muscle before going to bed by performing simple exercises can also be effective.[7]

Moreover few numbers of interventional studies to reduce leg cramps in pregnancy had been under taken in Kerala so the researcher was interested and decided to develop a type of stretching exercise for antenatal mothers. For reducing this common problem in pregnancy by instructing calf muscle stretching exercise.

Materials Methodology

The research design used for this study was quasi experimental with pre-test post-test control group design. Data was collected from the antenatal mothers of 28-34 weeks gestation at Sree Avittom Thirunal Hospital OPD Thiruvananthapuram.

Study design: Quasi experimental with pre-test post-test control group design.

Study location: This was a tertiary care based hospital study done in Antenatal out- patient department of Sree Avittom Thirunal Hospital, Thiruvananthapuram.

Study duration: May 2022 to August 2023

Sample size: 80 Antenatal mothers

Sample size calculation: Sample size is calculated using the formula

$$N = \frac{2sp^2(Z1-\alpha/2 + Z1-\beta)2}{\mu d^2}$$

$$SP^2 = \frac{S1^2+S2^2}{2}$$

$S1^2$ = Standard deviation in first group

$S2^2$= Standard deviation in second group

μd^2= Mean difference between samples

$1-\beta$ = Power

Standard deviation in group 1 =1.4

Standard deviation in group 2 =1.5

Mean difference = 1

Effect size = 0.689655

Alpha Error(%) = 5

Power (1-β) % = 80

I or 2 sided= 2

Required sample size per group = 33

Anticipating 10% dropout final sample size is 40 per group.

Subject and selection method: Subject in this research study were selected on the basis of intensity, frequency and duration of leg cramps among antenatal mothers who are of 28 to34 weeks of gestation experiencing leg cramps more than two times for two weeks. Samples were selected consecutively based on inclusion and exclusion criteria.

Group A (40): Experimental group instructed calf muscle stretching exercise

Group B (40): Control group with routine management

Inclusion criteria:

- Antenatal mothers who are willing to participate
- Antenatal mothers who have experienced leg cramps more than twice in two weeks

Exclusion criteria

- High risk antenatal mothers
- Antenatal women with psychiatric disorders.

Procedure methodology

The data collection was started after getting permission from Institutional Research Committee, Institutional Human Ethics Committee of Govt. College of Nursing Thiruvananthapuram, superintendent and Head of the department SAT Hospital Thiruvananthapuram. The duration of data collection was six weeks. The total sample size was 80, 40 participants in the experimental group and 40 participants in the control group and the antenatal mothers who satisfied the inclusion criteria and exclusion criteria were selected consecutively. The purpose of the study was explained and written consent obtained from each participant who were willing to participate in the study. The control group was selected initially to avoid contamination and the antenatal mothers were provided with a diary and advice to note down frequency, duration of leg cramps and intensity of pain was assessed by Numeric Pain Rating scale then followed up for two weeks. Mothers who had leg cramps more than two times for two weeks were included. The participants in the experimental group were comfortably seated in a separate room near to antenatal out- patient department and the investigator demonstrated calf muscle stretching exercise and return demonstration was done and doubts were clarified. The experimental group were instructed to practice stretching exercise in five repetitions on 10 second hold done two times a day for two weeks and reinforcement given via phone calls on alternative day. And instructed to write the intensity, duration and frequency of leg cramps on the given diary. Both groups were followed after two weeks and post test was conducted. The data was analysed by appropriate statistical method.

Calf muscle stretching exercise

First procedure

Advice the mother to sit on a firm surface stretch the legs and gently do plantar and dorsiflexion

Second procedure

By sitting on a chair hold a long towel to hold the foot and do dorsiflexion of the foot.

Repeat both the procedure simultaneously for 5 times on 10 second hold done two times a day.

Statistical analysis

Data was analysed using Statistical Package for Social science (SPSS) version 22. The data collected was analysed by means of descriptive and inferential statistics.

1. Description of participants based on sociodemographic data and clinical data was analysed using frequencies and percentage and comparability between experimental and control group was assessed by Chi-square test.
2. Frequency, duration and intensity of leg cramps before and after intervention were expressed in frequency and percentage.
3. Chi-square test was used to assess the comparability between the experimental and control group
4. Effectiveness of calf stretching exercise on intensity of leg cramps was analyzed by independent t-test.

Results

The analysis of the study findings was categorized, organized and presented under following sections.

Section A: Distribution of participants based on socio-demographic data

Section B: Distribution of participants based on clinical data

Section C: Distribution of participants based on history of leg cramps

Section D: Frequency of leg cramps, duration of leg cramps and intensity of leg cramps (NPRS score) among antenatal mothers before intervention.

Section E: Effectiveness of calf muscle stretching exercise on frequency, duration and intensity, (NPRS score) of leg cramps among antenatal women.

Section A: Distribution of participants based on socio demographic data

Regarding the age of participants, 55% of participants in the experimental group and 47.5% of participants in the control group were in the age group of 25-29 years whereas 15% participants in the experimental group and 30% participants in the control group were between the age group of 20-24 years.

Out of 80 participants, 65% participants in the experimental group and 75% of the participants in the control group were Hindus.

Section B: Distribution of participants based clinical data

Among 80 participants, 85% participants in the experimental group and 70% participants in the control group had over weight. Out of 80 participants, 35% participants in the experimental group and 47.5% participants in the control group were second gravida.

Regarding the parity, 42.5% participants in the experimental group and 47.5% participants in the control group were nullipara. Whereas 35% participants in the experimental group and 47.5% participants in the control group were primipara.

Section C: Distribution of participants based on history of leg cramps

Regarding the time of occurrence of leg cramps, 80% of participants in the experimental group and 77.5% participants in the control group had leg cramps during sleep whereas 2.5% participants in the experimental group and 12.5% participants in the control group had leg cramps at rest.

Based on the site of leg cramps, 77.5% participants in the experimental group and 67.5% participants in the control group had leg cramps below and behind knee whereas 15% participants in the experimental group and 20% participants in the control group had leg cramps on the calf muscle.

Section D: Frequency of leg cramps, duration of leg cramps and intensity of leg cramps (NPRS score) of antenatal mothers before intervention

Table 1: Percentage and frequency showing frequency of leg cramps in experimental and control group before intervention

Frequency of leg cramps within group 2 weeks	Experimental group		Control group		X^2	df	p
	n = 40		n = 40				
	f	%	f	%			
One time	0	0.0	1	2.5	4.9	3	.170
2 to 3 times	2.1	52.5	28	70.0			
4 to 5 times	15	37.5	7	17.5			
>5times	4	10.0	4	10.0			

Table no 1 showing that 52.5% participants in the experimental group and 70% participants in the control group had leg cramps 2 to 3 times whereas 37.5% participants in the experimental group and

17.5% participants in the control group had leg cramps 4 to 5 times. Since the observed difference was not statistically significant for p>0.05, both the group were comparable based on frequency of leg cramps.

Table 2: Showing Percentage and frequency showing duration of leg cramps in experimental and control group before intervention.

Duration of leg cramps within 2 weeks	Experimental group n= 40		Control group n =40		X^2	df	p
	f	%	f	%			
<5 seconds	8	20.0	11	27.5	1.1	2	.585
5-10 seconds	23	57.5	23	57.5			
>10 seconds	9	22.5	6	15.0			

Table 3: Showing Percentage and frequency showing intensity of leg cramps (NPRS score) among experimental and control group before intervention

Intensity of leg Cramps (NPRS score) within 2 weeks	Experimental group n= 40		Control group n =40		X^2	df	p
	f	%	f	%			
Mild (1-3)	3	7.5	4	10.0	2.3	2	.321
Moderate (4-6)	37	92.5	34	85.0			
Severe (>7)	0	0.0	2	5.0			

From table 23 it is evident that the majority (92.5%) participants in the experimental group and 85% participants in the control group had NPRS score between 4-6. Since the observed difference was not statistically significant for a p value >0.05, both groups were comparable based on NPRS score.

Section E: Effectiveness of calf muscle stretching exercise on frequency, duration and intensity, (NPRS score) of leg cramps among antenatal women.

Table 4: Shows Mean, SD and t value showing the effectiveness of calf muscle stretching exercise on intensity of leg cramps (NPRS score) among experimental and control group

n= 80

Group n Mean SD	Pre-test NPRS Score			Post –test NPRS Score			Difeerence i Pre- test Post- test	t	p
	n	Mean	SD	n	Mean	SD			
Experimental 40	4.85	1.03	2.83	0.96	2.03	0.66	8.1	8.1	0.001
Control 40	4.73	1.24	4.38	1.33	0.35	1.14			

Table no 1 shows mean difference in intensity of leg cramps (NPRS score) in the experimental group was 2.03±0.66 and in the control group was 0.35±1.14 and the calculated p value was <0.05. Hence it is statistically significant and therefore the null hypothesis is rejected and an alternative hypothesis is accepted. Thus, it can be concluded that calf muscle stretching exercise is effective in reducing frequency, duration and intensity of leg cramps among antenatal mothers.

Discussion

The present study was conducted to assess the effectiveness of calf muscle stretching exercise on leg

cramps among antenatal mothers attending a tertiary care centre, Thiruvananthapuram.

Lengthening or stretching the cramping muscle and activating the antagonist muscles helps to stop most cramps based on the observation that stretching exercise will treat acute cramps.[8] Muscle stretching was capable of sharply interrupting cramps induced both by voluntary contraction and by high-frequency stimulation of peripheral nerve.[9]

The present study showed that calf muscle stretching exercise is effective in reducing duration and intensity of leg cramps among antenatal mothers also the present study showed that 70% participants in the experimental group and 20% participants in the control group had mild leg cramps (NPRS score between 1-3) whereas 30% participants in the experimental group and 72.5% participants in the control group had moderate leg cramps (NPRS score between 4-6) and only 7.5% participants in the control group and no one from experimental group had severe leg cramps with NPRS score >7. In the present study, mean difference in the NPRS score in experimental group was 2.03±0.66 and in the control group was 0.35±1.14 and the calculated p value was <0.05 and concluded that calf muscle stretching exercise is effective in reducing intensity of leg cramps among antenatal mothers. The study result was supported by a comparative study which assessed the effectiveness of stretching versus cryotherapy on leg cramps. The study results shown that the mean difference in VAS score in experimental group was 5.966±4.66 and in the control group was 6.3±4.033 at a 5% level of significance and the study concluded that Stretching exercise when given alone reduces the intensity of pain.[10]

Limitations of the study

- The duration of study period was limited to six weeks.
- Long term follow up was not done, so improvement after cessation of active treatment is not known.
- The outcome measures used in the study were subjective, so patient's own perception for her condition may play an important role in measuring her symptoms.

Conclusion

Stretching is the general term used to describe any therapeutic manoeuvre designed to increase mobility of soft tissues and subsequently improve range of motion by lengthening structures that have adaptively shortened and have become hypo mobile over time. Stretching exercise will help to reduce the intensity of leg cramps among pregnant women which were most commonly seen in the second trimester of pregnancy. The researcher was interested and decided to develop a type of stretching exercise for antenatal mothers also during the clinical posting the researcher identify that calf muscle cramps are sever in second trimester of pregnancy and the mothers were suffering due to leg cramps while they were in labour coat. The researcher is interested to reduce this common problem in pregnancy by instructing calf muscle stretching exercise.

Source of funding: self

Conflict of interest: Nil

Ethical clearance from Institutional Ethics Committee Govt. College of Nursing,

Medical college, Thiruvananthapuram Date: 25/1/24 Ref.No: CNT/IEC/58/30/2022

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