A Comparative Study between Effects of Stretching vs. Effects of Cryotherapy and Stretching for Calf Cramps in Antenatal Women

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Abstract

Total 60 women aged 25-35 years (30 in each group) who is having gestational age of 5 months or more were tested for calf cramps. The treatment modality given; were stretching exercises and cryotherapy, the case groups given both whereas controls were given only stretching exercises. The outcome I got was; there was no statistically significant difference in terms of pain scale, ankle ROM between both the group, however, case groups were better clinically in terms of severity and frequency of calf cramps.

Keywords: Cryotherapy; Calf Cramps; Women

Introduction

Calf cramps are very much common among antenatal women specially after second trimester, which affects half of all pregnant women. This cramps are mostly experienced during night, but some may experience calf cramps during the day. The frequency of cramps may increase in third trimester [1].

Anatomy of calf muscles [2]

Calf is the group of muscles which includes gastrocnemius, soleus and plantaris muscle. The gastrocnemius is shorter, thicker and has two attachments (inner and outer). It is the most visible of the calf muscles. The soleus lies underneath. These three muscles attach to the achilles tendon.

Figure 1

Definition of cramp

The involuntary pulling or sudden contraction of muscle, which creates excruciating pain, is known as cramp [45].

Causes of cramps during pregnancy [3]

1. Extra weight of body due to fetal growth leads to calf cramps.
2. Mineral or vitamin deficiency such as lack of calcium, magnesium or potassium may cause calf cramps.
3. Dehydration also can cause calf cramps in pregnant women.
4. Hormonal changes taking place during pregnancy can also cause cramps in leg.
5. Too much of phosphorous in the body (which is present in processed meat, snacks and soda) is another cause of leg cramps. Phosphorous affects the capacity of the body to absorb calcium from the ingested food.
6. Increasing pressure of the expanding uterus on the blood vessels around the uterus (going down/coming up to/from legs) and excess pressure on the blood vessels in the legs leads to calf cramps. Similarly, increasing pressure of the growing uterus on the nerves around the uterus and in the legs results in calf cramps.

Physiology

"Calf pump and peripheral heart", in the upright position of the body, the venous return from the lower limb depends largely on the

contraction of the calf muscles, these muscles are therefore known as the “calf pump” [2].

For the same reason the soleus is sometimes called the peripheral heart. When this muscle contracts blood contained in large sinuses within it is pumped into the deep veins and when the muscle relaxes blood flows into the sinuses from the superficial veins [2].

During pregnancy the women have additional 40 - 50% of extra blood volume in the system which needs to be pumped around in the body. While walking calf muscle act like a pump and help the blood to flow against gravity, back up towards the heart. During lying down it is not as easy for the heart to do all the work, pumping the extra blood down to the feet and then back up again. Due to pooling of the fluid the circulation slows down and swelling can occur in the veins in the legs. This fluid retention can lead to calf cramps [3,5].

Treatment

Calf cramps can be treated by stretching exercise, ice therapy, gentle massage techniques, analgesics and vitamin and mineral supplements depending upon the cause [1].

Cryotherapy

Cryotherapy is the local or general use of low temperatures in medical therapy. The term "cryotherapy" comes from the Greek cryo meaning cold, and therapy meaning cure. Cryotherapy has been used as early as the seventeenth century [4].

Its goal is to decrease cellular metabolism, increase cellular survival, decrease inflammation, decrease pain and spasm, promote vasoconstriction, and when using extreme temperatures, to destroy cells by crystallizing the cytosol [6].

Cooling occurs when heat is removed or lost from an object through conduction of heat from one mass to another, or through evaporation.

Conduction occurs when heat is transferred from a warm body to a colder body by direct contact between their surface molecules. the slow moving molecules of the cold body speed up by absorbing energy from the faster moving molecules of the warm body, thereby becoming warmer, while, conversely, the faster moving molecules of the warm body slow down as they lose energy and become cooler.

Conduction occurs when a cool mass (like ice) is applied continuously to the skin, or when a body part is immersed in cold water. As the body or body part cools, the ice or cold water heats up [7].

Physiological principles

Cryotherapy works on the principle of LEWIS HUNTING REACTION: there is immediate vaso constriction of blood vessels, which restricts the blood flow in the skin so the heat loss is minimized. The speed with which this vaso constriction occurs indicates that it is a reflex in the autonomic nervous system which is triggered by the stimulation of the thermal receptors in the skin after some minutes the vaso constriction may give way to a marked vaso dilatation which itself may last some 15 minutes before being replaced by another episode of vaso-constriction. This alteration of constriction and dilatation is known as LEWIS HUNTING REACTION [7].

The cooling effect on the soft tissue by an ice massage or ice pack will decrease with depth of the tissue increases

The time required for cooling to be effective will vary according to the type of tissue being cooled (the speed of cooling underlying tissues will decrease as the amount of insulating fat increases) [4].

As cooling decreases tissue temperatures, the sensory nerves in the skin are provoked to fire continuously until physiologically exhausted. Usually this causes the subject to predictably experience a sequence of sensations including aching, burning, and finally numbness (though exceptions will be found). Numbness or temporary local anesthesia occurs as the sensory nerves are exhausted [7].

Stretching

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 [23].

Response to stretch

When a muscle is stretched and elongated, the stretch force is transmitted to the muscle fibres via the connective tissue in and around the fibres.

During passive stretch both longitudinal and lateral force transduction occurs. when initial lengthening occurs in the series elastic component, tension rises sharply. after a point there is a mechanical disruption of the cross bridges as the filament slides apart leading to an abrupt lengthening of sarcomeres known as sarcomere give. when the stretch force is released the individual sarcomere returns to their resting length [9,10].

The neurophysiologic response of muscle to stretch [11]

When a muscle is stretched very quickly the primary afferent fibres stimulates alpha motor neuron in the spinal cord and facili-

tates contraction of extrafusal fibres, increasing tension in a muscle. This is called the monosynaptic stretch reflex.

Figure 2

Stretching procedures that are performed at too high a velocity may actually increase the tension in a muscle that is to be lengthened. If a slow stretch force is applied to muscle, the GTO (golgi tendon organ) fires and inhibits the tension in the muscle, allowing the parallel elastic component of the muscle to remain relaxed and lengthened [10,12].

Review of Literature

Blyton F. chuter V, walter kE, burns J (2012) jan

About one in every two pregnant women are affected by lower limb muscle cramps. For some women these cramps reduce quality of life, quality of sleep and participation in activities of daily living. Many interventions are available for calf cramps but some are controversial.

The objective of study was to assess the effect of non-drug non-invasive treatment for calf cramp.

All randomized controlled trial of non drug non invasive interventions over at least four weeks for the prevention of calf muscle cramps. They excluded the surgery, acupuncture, and dry needling as invasive interventions. They selected only trials that included at least one of the following outcomes: cramp frequency, cramp severity, health related quality of life, quality of sleep, participation in activities of daily living and adverse outcomes.

49 participants were advised to complete lean to wall calf muscle stretch held for 10 seconds 3 times per day. 48 participants were allocated to the control group.

After 12 weeks there was statistically significant difference in recalled calf cramp frequency between two groups [39].

Young GL, jewell D (2000)

Many women experience calf cramps in second half of pregnancy.

The objective of this review was to assess the effects of cryotherapy for the treatment of calf cramps in pregnancy

Randomized trials of treatments for calf cramps persisting for at least 2 weeks in pregnancy.

The trials involving 217 women were included. Compared with control group cryotherapy reduce calf cramps (odds ratio 0.29,95% confidence interval 0.15 to 0.56 [40].

Ireland ML, ott SM 2000

During pregnancy the female body undergoes many hormonal changes and anatomical changes that affect the musculoskeletal system for e.g. calf crmps, back pain, girdle pain etc. These changes may cause various musculoskeletal complaints predispose to injury or alter the course of pre existing conditions. Treatments of musculoskeletal complaints during pregnancy must include the potential effect on mother [41].

Ireland ML, ott SM 2000

- Their purpose was to determine whether women with pregnancy related cramps would benefit from stretching exercise.
- 73 women with pregnancy related leg cramps were interviewed about their symptoms in a prospective double blind randomized trials. The experimental group was given stretching exercise for 2 weeks after which new interviews were performed.
- Calf stretching exercise in these patients decrease leg cramps symptoms ($p<0.05$) compared with the control group.
- Calf stretching exercise seems to be a valuable therapeutic tool in the treatment of pregnancy related leg cramps [42].

Ireland ML, ott SM 2000

- Most calf cramps occur during pregnancy are benign If symptomatic treatment is desired, the first choice appear would be stretching. If that is ineffective carisoprodol, vitamin E or verapamil hydrochloride may be used [43].

Ireland ML, ott SM 2000

- Benign nocturnal calf cramps are relatively common and bothersome complaint particularly among the pregnant women after second trimester.

- Careful history taking and physical examination can exclude the majority disorders in differential diagnosis.
- Mechanical treatment of an acute calf cramps involves stretching of the calf muscle.
- Prophylaxis includes both mechanical and pharmacological measures [44].

Reichel G. march 2009

- Calf cramps are sudden, involuntary painful contractions of part or the entire calf muscle that are visible persists for seconds or minutes and then spontaneously resolve. They can occur with no identifiable cause and are referred to as common calf cramps.
- The recommended treatment for patients with calf cramps causing significant impairment of well being is oral administration of quinidine or botulinum toxin. During pregnancy both products are contraindicated so administration of magnesium is indicated along with calf stretching exercises [45].

Richard J Coppin march 2005

- Magnesium supplements are common treatment for nocturnal leg cramps. An uncontrolled study suggested that calf stretching exercises could prevent nocturnal leg cramps in pregnant women.
- To assess the effect of calf stretching exercise and cessation of magnesium supplements for nocturnal calf cramps in antenatal women.
- They conducted the randomized controlled trial and found out that calf stretching exercises are not effective in reducing the frequency or severity of calf cramps. Advising those on long term repeat prescriptions to try stopping magnesium supplements temporarily will result in no major problems for patients and allow a significant number to stop medication [46].

Kannan N, Sawaya R, june 2001

- Nocturnal leg cramps are common occurrence among pregnant women. Although there are many known causes- endocrinologic, vascular, treatment with certain drugs and occupational factors.
- History, physical examination and laboratory testing can provide clues for distinguishing between cramps with identifiable cause and idiopathic case.
- For non idiopathic cases, the management consists of treating the underlying causes whenever possible.

- A non pharmacological approach i.e. massaging and stretching is the recommended first line treatment for idiopathic cases [47].

George Wells, anita lav

A meta analysis of eight (four published and four unpublished randomized double blind trials) was conducted seven of which had cross over design. 659 pregnant subjects were chosen who suffered from regular nocturnal leg cramps. When individual patient data from all cross over studies were pooled, persons had 3.60 (95% CI 2.15, 5.05) fewer cramps in a 4 week period doing stretching exercise compared with control group. This compared with an estimate of 8.83 fewer cramps (95% CI 4.16, 13.49) from pooling published studies alone. The corresponding relative risk reductions were 21% (95% CI 12%, 30%) and 43% (95% CI 21%, 65%). They had concluded that stretching exercise is effective in the prevention of nocturnal leg cramps [48].

Experimental hypothesis

Cryotherapy along with stretching exercise is more effective than stretching exercise alone on outcome of the intensity of pain, ankle dorsiflexion range and incidence of cramps in antenatal women having calf cramps.

Null hypothesis

There is no significant difference between the intensity of pain, ankle dorsiflexion range and incidence of cramps in antenatal women who undergo stretching exercise alone and women who undergo stretching exercise with icepack treatment.

Methodology

- **Research design:** Interventional study
- **Sampling method:** Purposive sampling

Method of data collection

This study was conducted on 60 antenatal women having calf cramps. After fulfilling the inclusion and exclusion criteria; detailed assessment was taken for each patient. Prior to the participation in study the patients were explained about the procedure and their consent was taken for voluntary participation.

Population

Antenatal women between 25 to 35 years having calf cramps who have gestational age between 5 to 9 months.

- Source of data: Agman maternity hospital, Mathur hospital and Prabhu krupa hospital.

Variables

Visual analogue scale (VAS)

Visual or linear along scale attempt to represent measurement quantities in terms of a straight line placed horizontally or vertically on paper. the end points of a line are lined with descriptive or numeric terms to anchor the extremes of the scale and provide the frame of reference for any point in the continuum between them. some scales will also use descriptors or numeric intervals between the endpoints to assist the individual in grading responses. Commonly the entire visual analog scale is 10 cm long, but the distance of 15 and 20 CMS are also used. the patient is asked to bisect the line at a point representing self-reported position on the scale. the patient's score is then obtained by measuring from the zero mark bisecting the scale [13-15].

Ankle range of motion

The normal human ankle joint has dorsiflexion range 0-20 degrees. It is measured with goniometer [16].

Incidence of cramps

The frequency of the cramps during 24 horurs was taken. The patient was told to keep the records of the incidence before and after applying treatment.

Procedure

To be included in the study the antenatal women was diagnosed by gynaecologist. The parent/care taker were explained the test procedure, the consent forms were signed before starting a test procedure.

On the first visit, a complete assessment was done. Evaluation form is given in annexure 2 and consent form signed given in annexure 1.

Pre participation evaluation form consisted of vas score, ankle dorsiflexion range and incidence of cramps during 24hrs and assessment chart which include personal information, chief complaints, pain, observational and examination findings were done thoroughly.

Both groups of patients were recorded for their pain on vas scale at the time of cramps, ankle dorsiflexion range by goniometry measurement and incidence of cramps during 24hrs on the 1st day and 15th day of the study protocol.

Clinical interventions

Patients of both group were assessed properly and were given conservative management according to below mentioned protocol for 15 days with one session per day.

- Group A was given stretching exercise
- Group B was given stretching exercise with cryotherpay

Initially the subject of group A was assessed for the pain intensity when patient gets the episode of calf cramps by means of vas, an ankle dorsiflexion range was taken and incidence of cramps during 24hrs was also noted on 1st day and 15th day of the treatment protocol.

The subject was then given calf stretching with the holding time 30 secs and given 5 repititions8.The manoeuvre was continued for15 days. The follow up pain intensity range of motion and incidence of cramps after 15 days was once again taken.

Now group B subjects were made to undergo cryotherapy for 15 mins before applying a calf stretch, with the ice packs kept on the belly of calf muscle [7] the pain intensity, range of motion and incidence of cramps were compared before and after doing this procedure.

Both the groups were given following advices

1. Always stay hydrated, drink plenty of fluids
2. Avoid wearing high heel shoes
3. Avoid keeping the legs hanging for prolonged periods of time.

Hand placement and procedure for calf stretching [8]

- Position of the patient: Long sitting
- Position of therapist: Standing position in front of the patient

The patient's heel is grasped with one hand, the subtalar joint is maintained in neutral position and the forearm is placed along the planter surface of the foot.

The anterior aspect of the tibia is stabilized with other hand.

The talocrural joint of the ankle is dorsiflexed by pulling the calcaneus in and inferior direction with the thumb and fingers while gentle pressure is applied in superior direction just proximal to the head of the metatarsal with forearm.

Procedure for applying cryotherapy [7]

The ice pack is kept under the belly of calf muscle for 15 minutes prior to stretching exercise.

Procedure for measuring active ankle dorsiflexion range [16]

- **Position of patient:** Sitting at the end of the couch and the legs are kept hanging.
- **Axis:** Tip of the medial malleolus.
- **Stable arm:** It is placed over the midline of the medial aspect of the leg.

- **Movable arm:** Movable arm is placed to the 90 degree of the stable arm.

Figure 3: Procedure for measuring active ankle dorsiflexion range.

Figure 4: Patient performing active ankle dorsiflexion.

Figure 5: Ice pack.

Figure 6: Procedure for applying cryotherapy.

Figure 7: Procedure for applying calf stretching.

Data analysis

Statistical methods

The data were tabulated and analysed using descriptive and interferential statistics.

To assess all parameters descriptive statistics like mean and standard deviation are used;

Arithmetic mean

$$\bar{x} = \frac{\sum x}{N}$$

Where, $\bar{x}$ = Arithmetic
 $\sum x$ = Sum of the variable
 N = the total number of variables.

Standard deviation (SD)

$$SD = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}}$$

$\sum(x^2)$ = Sum of the square of the variables
 $(\sum x)^2$ = Square of the sum of the variables
n = Number of variables

To find the changes that occurred during treatment within the groups pre treatment and post treatment measures were measured by interferential statistics called “paired t-test”.

$$t = \frac{\bar{x}}{SD/\sqrt{n}}$$

$\bar{x}$ = Mean of difference of observations.
 $X_1 - X_2$ = Difference of observations
SD = Standard deviation of differences of observations
n = sample size

To find the changes that occurred during the treatment between the groups were measured by inferential statistics using unpaired t test

$$t_{test} = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

In this study 60 antenatal women having calf cramps were taken. Results of the study are as under

Comparison of pre treatment and post treatment values of pain and ankle range of motion (ROM) within group A and group B

Variable	Group	Pre Mean +-sd	Post Mean +-Sd	t-value	Stastical significance
VAS	A	5.966 +-1.93	4.666 +-1.84	12.05	P<0.05,S
	B	6.3+-1.78	4.033 +-1.71	16.93	P<0.05, S
Ankle dorsiflexion Range	A	12.96 +-1.938	14.96 +-1.82	33.50	P<0.05,S
	B	12.56 +-1.88	15.13 +-1.30	18.25	P<0.05, S
Incidence of Cramps	A	5.63 +-1.67	4.03 +-1.37	13.06	P<0.05,S
	B	6.066 +-1.57	3.33 +-1.54	19.14	P<0.05, S

Table 1: Paired t-test.

Variable	Group	Group-A Mean +-sd	Group-B Mean+-sd	t-value	Statistical significance
VAS	Pre	5.966 +-1.93	6.3+-1.78	0.70	p>0.05,ns
	Post	4.666 +-1.84	4.033 +-1.71	1.38	p>0.05,ns
Ankle dorsiflexion Range	Pre	12.96 +-1.93	12.56 +-1.88	0.83	p>0.05,ns
	Post	14.96 +-1.82	15.13 +-1.30	0.42	p>0.05,ns
Incidence of cramps	pre	5.63 +-1.67	6.066 +-1.57	1.04	p>0.05,ns
	Post	4.03 +-1.37	3.33 +-1.54	1.87	p>0.05,ns

Table 2: Unpaired T-Test.

Comparison of pre treatment and post treatment values of pain within group A and group B 0.05
*S-Significant
NS-Non significant

Variables	Group	Mean Difference
VAS	Group A	1.3
	Group B	2.26
Ankle Dorsiflexion Range	Group A	1.96
	Group B	2.57
Incidence of Cramps	Group A	1.6
	Group B	2.73

Table 3: Comparison of mean difference of group A&B.

For VAS Scale
Paired t test (graph 1)

- **GROUP A:** when the pre and post treatment values of pain within group A are analyzed by paired “t” test at 5%level of significance. the calculated value is 12.05, which is greater than the table value of 2.05 for 29 degrees of freedom.
- **GROUP B:** when the pre and post treatment values of pain within group B are analyzed by paired “t” test at 5%level of significance the calculated value is 16.93, which is greater than the table value of 2.05 for 29 degrees of freedom.

Applying paired t-test

For Group A:

$$t = \text{mean} / \text{sd} / \sqrt{n}$$
$$= 1.3 / 0.59 / 5.47$$
$$= 12.05$$

For Group B:

$$t = 2.26 / 0.73 / 5.47$$
$$= 16.93$$

Inference

The t value for both group A and B is 12.05 and 16.93 respectively which is greater than the table value at 5% level significance. So we can say that both the treatment has the t value which is statistically significant so both are effective although group B is more effective.

Unpaired t test (graph 2)

- When the pre treatment values of pain within group A&B are analyzed by independent “t” test at 5% level of significance the value is 0.70 which is lesser than the table value of 2.0 at 58 degrees of freedom.
- When the post treatment values of pain within group A and B are analyzed by independent “t” test at 5% level of significance the value is 1.38 which is lesser than the table value of 2.0 at 58 degrees of freedom.

Inference

- There is no significant difference of pre treatment VAS values of pain in patients receiving stretching exercise and cryotherapy plus stretching exercise
- There is no significant difference in post treatment VAS values of pain in patients receiving stretching exercise and cryotherapy plus stretching exercise.
- The values for obtained unpaired t test is not statistically significant but group b subjects have more reduction in VAS as can be seen from mean difference of group A and B 1.3 and 2.26 respectively. so cryotherapy plus stretching exercise are more effective clinically.

For ankle dorsiflexion range

Paired t test (graph 3)

- **GROUP A:** when the pre and post treatment values of ankle dorsiflexion range within group A are analyzed by paired “t” test at 5% level of significance. the calculated value is 33.50, which is greater than the table value of 2.05 for 29 degrees of freedom.

- **GROUP B:** when the pre and post treatment values of ankle dorsiflexion range within group B are analyzed by paired “t” test at 5% level of significance the calculated value is 18.25, which is greater than the table value of 2.05 for 29 degrees of freedom.

Applying paired t-test

For Group A:

$$t = \text{mean} / \text{sd} / \sqrt{n}$$
$$= 1.96 / 0.32 / 5.47$$
$$= 33.50$$

For Group B:

$$t = 2.57 / 0.77 / 5.47$$
$$= 18.25$$

Inference

The t value for both group A and B is 33.50 and 18.25 respectively which is greater than the table value at 5% level significance. so we can say that both the treatment has the t value which is statistically significant so both are effective although group B is more effective.

Unpaired t test (graph 4)

- When the pre treatment values of ankle dorsiflexion range within group A&B are analyzed by independent “t” test at 5% level of significance the value is 0.83 which is lesser than the table value of 2.0 at 58 degrees of freedom.
- When the post treatment values of ankle dorsiflexion range within group A and B are analyzed by independent “t” test at 5% level of significance the value is 0.42 which is lesser than the table value of 2.0 at 58 degrees of freedom.

Inference

- There is no significant difference of pre treatment values of ankle dorsiflexion range in patients receiving stretching exercise and cryotherapy plus stretching exercise.
- There is no significant difference in post treatment values of ankle dorsiflexion range in patients receiving stretching exercise and cryotherapy plus stretching exercise.
- The values for obtained unpaired t test is not statistically significant but group b subjects have more reduction in ankle dorsiflexion range as can be seen from mean difference of group A and B 1.96 and 2.57 respectively. so cryotherapy plus stretching exercise are more effective clinically.

For incidence of cramps

Paired t test (graph 5)

- **GROUP A:** when the pre and post treatment values of incidence of cramps within group A are analyzed by paired “t” test at 5% level of significance. the calculated value is 13.06, which is greater than the table value of 2.05 for 29 degrees of freedom.
- **GROUP B:** when the pre and post treatment values of incidence of cramps within group B are analyzed by paired “t” test at 5% level of significance the calculated value is 19.14, which is greater than the table value of 2.05 for 29 degrees of freedom.

Applying paired t-test

For Group A:

$$t = \frac{\text{mean}}{\text{sd}/\sqrt{n}}$$
$$= \frac{1.6}{0.67/5.47}$$
$$= 13.06$$

For Group B:

$$t = \frac{2.73}{0.78/5.47}$$
$$= 19.14$$

Inference

The t value for both group A and B is 13.06 and 19.14 respectively which is greater than the table value at 5% level significance. So we can say that both the treatment has the t value which is statistically significant so both are effective although group B is more effective.

Unpaired t test (graph 6)

- When the pre treatment values of incidence of cramps with in group A and group B are analyzed by independent “t” test at 5% level of significance the value is 1.04 which is lesser than the table value of 2.0 at 58 degrees of freedom.
- When the post treatment values of incidence of cramps with in group A and B are analyzed by independent “t” test at 5% level of significance the value is 1.87 which is lesser than the table value of 2.0 at 58 degrees of freedom.

Inference

- There is no significant difference of pre treatment values of incidence of cramps in patients receiving stretching exercise and cryotherapy plus stretching exercise.
- There is no significant difference in post treatment values of incidence of cramps in patients receiving stretching exercise and cryotherapy plus stretching exercise.

- The values for obtained unpaired t test is not statistically significant but group b subjects have more reduction in incidence of cramps as can be seen from mean difference of group A and B 1.6 and 2.73 respectively. So cryotherapy plus stretching exercise are more effective clinically.

Limitations

- Intensity level may differ in nulliparous and multiparous women; VAS grossly describes the intensity of pain.
- Range of motion may differ due to body built of the patient, tightness of calf muscle.
- 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 exercise when given alone reduces the intensity of pain on VAS score, ankle dorsiflexion range and incidence of cramps. Cryotherapy when given with stretching exercise can help in increasing positive findings significantly in antenatal women. The findings obtained in this study imply that cryotherapy with stretching is more effective clinically however the difference is not statistically significant, so both the treatments should be considered effective.

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