The Effect of Calf Stretching Box on Stretching Calf Muscle Compliance: A Prospective, Randomized Single-Blinded Controlled Trial

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Primary Objective: *To study the effect of calf stretching box usage in increasing the compliance of performing calf stretching exercise as compared to the conventional exercise method.*
Secondary Objective: *To study the effect of calf stretching box usage in decreasing the calf muscle tightness and complications as compared to the conventional exercise method.*
Material and Method: *Eighty patients older than 45 years old with calf muscles tightness were enrolled in a prospective, randomized single-blinded controlled trial at the out-patient Rehabilitation medicine clinic, Siriraj Hospital, Bangkok, Thailand between April and August 2009. Patients were randomized into two groups, the study group (stretching by using calf stretching box) and the control group (stretching by the conventional exercise method). Patients in both groups were asked to hold the stretch for at least 1 minute and to perform the stretching program at least two times per day, every day for two weeks. Furthermore, they were asked to record the real frequency and duration of their exercise and complications in a logbook every day.*
Results: *Thirty-eight patients in each group completed the study. The baseline characteristics of the patients in both groups were similar. The study group had higher frequency and longer duration of performing calf stretching exercise than the control group. They also reported more decrease of calf muscle tightness with less pain complication (shoulder pain, knee pain, low back pain, and calf muscle pain) than the control group ($p < 0.05$). However, there were no significant differences in the (between before and after) numbers of taut bands, trigger points, and tender points of calf muscle and degree of ankle range of motion between the two groups.*
Conclusion: *Stretching calf muscle with calf stretching box can increase compliance, decrease calf muscle tightness and decrease complications when compared with the conventional exercise method.*

Keywords: *Stretching, Calf muscle, Gastrosoleus muscle, Calf stretching box, Compliance*

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Calf muscle or gastrocnemius and soleus muscle tightness with or without reduced range of ankle joint dorsiflexion are related to a number of lower limb disorders, including Achilles tendinitis, plantar fasciitis, and tendon injury[1-3]. As a result, calf muscle stretches are commonly prescribed in an attempt to reduce the symptoms of such disorders[4-6]. The principle of calf muscle stretching is to move ankle into dorsiflexion position by external force such as the patient's own weight and sustain in that position for a while. The conventional calf muscle stretching method is "leaning into the wall" exercise. Patients were taught to perform this exercise while standing and leaning into the wall with the affected leg placed behind the contralateral leg. Patient were told to place their hands on the wall to help their balance, bend the front knee while keeping the back knee straight and the heel firmly on the ground. The other method is "foot on the step" exercise. Patients were asked to put the foot of their affected leg on the step such as the ladder or the door step and lean the body forward. These two methods of exercise can make the ankle in dorsiflexion position. The calf stretching exercise will be useful when the patient sustain in the stretching position for at least

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30 seconds to 1 minute depending on the severity of calf tightness, and perform this exercise daily or twice daily[7]. Some complications may occur especially in the elderly patients. The common complications that can be found from the "leaning into the wall" exercise are shoulder pain, knee pain, low back pain, calf muscle pain, and Achilles tendon pain. The common complications that can be found from the "foot on the step" exercise are foot pain, calf muscle pain, and Achilles tendon pain. If the patients have the complications during performing the stretching exercise, they may do it with shorter duration and less frequency than prescribed. That will affect the result of the treatment.

"Calf stretching box" was designed by the foot care team of the Faculty of Medicine Siriraj Hospital, Mahidol University, Thailand (Fig. 1). This box was made of wood and covered with soft material. Because one side of the box was designed in round shape, it may decrease the complication of foot pain compare to stepping on a hard sharp edge. The calf stretching box was designed to come with many difference sizes that can be matched to all foot sizes, this may decrease the complications of calf muscle and Achilles tendon pain due to overstretching (performing too much ankle dorsiflexion). To use this box, patients were asked to put the foot of their affected leg on the box and lean the body forward (Fig. 2). Because the patients do not need to place their hands on the wall or bend the front knee, this exercise may decrease the complications of shoulder pain, knee pain and low back pain when compare to "leaning into the wall" exercise.

The authors hypothesized that stretching calf muscle with calf stretching box can decrease the complications. In addition, with lesser complications, the patients will perform this stretching exercise in longer duration and more frequency than the conventional exercise method.

Fig. 1 Calf stretching box

Fig. 2 Patient puts the foot of his affected leg on the box and leans the body forward

Objective

Primary objective

To study the effect of calf stretching box usage in increasing the compliance of performing calf stretching exercise compare to the conventional exercise method.

Secondary objective

To study the effect of calf stretching box usage in decreasing the calf muscle tightness when compared to the conventional exercise method.

To study the effect of calf stretching box usage in decreasing the complications of calf muscle stretching when compared to the conventional exercise method.

Material and Method

Patients

Between April 30 and August 30, 2009, 80 patients who had calf muscles tightness were enrolled in the study by announcement at Out Patient Rehabilitation medicine clinic, Siriraj Hospital.

The inclusion criteria included being one who was more than forty-five years old with calf muscle

tightness. Patients were not admitted to the study if any of the following criteria were present: (1) having weakness or spasticity of gastrocnemius-soleus muscle, (2) having continuous treatment of muscle tightness by medication, Thai traditional massage, or physiotherapy, or (3) having the diseases or conditions that cause severe back or knee pain such as inflammation or arthritis at the study time. (Calf muscle tightness means (1) symptom of dull pain and tightness at calf muscle, (2) no sign of acute calf muscle strain, (3) may limit ankle range of motion, and (4) the symptom can decrease when perform calf muscle stretching exercise)[8]. A physiatrist who specialized in foot disorders conducted a physical examination and confirmed the clinical diagnosis of calf muscle tightness. If the patients had bilateral calf muscle tightness, the more severity one which considered by numeric rating scale and physical examination would be chosen.

Sample size calculation

The length of time a stretch must be held to facilitate an increase in muscle flexibility remained a point of disagreement among physicians. The clinical literature stated that stretches should be held for a minimum of 30 seconds in young individuals and 60 seconds in older individuals[7]. For calf muscle, there was no literature that showed the proper program of performing calf stretching exercise. Only one systemic review showed that the duration for increasing ankle dorsiflex motion was 5-20 minutes of calf muscle stretch[9,10]. The authors thought that it is too long for treatment of calf muscle tightness. The authors considered that the proper program was one minute per time, two times per day, and five days per week.

Sample size calculation was based on the ability to detect a clinically important difference in compliance of 480 seconds (8 minutes) per two weeks between two groups. Based on past clinical record, the mean of compliance of the conventional exercise method was 720 seconds (12 minutes) per two weeks. Based on 0.80 power to detect a significant difference (5% type I error and 20% type II error, $p = 0.05$, two-sided), 37 patients were required for each study group. To compensate for non-evaluable patients, the authors planned to enroll 40 patients per group.

Study protocol, data collection and outcome measurement

Patients who met the inclusion criteria for the study completed a self-administered questionnaire that provided background information and status of calf muscle tightness and pain during one week before study. The background information included age, gender, marital status, educational level, occupation, monthly income, co-morbid disease, hours of free time, habit of performing exercise and previous knowledge of calf stretching method. The status of calf muscle tightness was recorded by numeric rating scale. The question was scored from 0 (no tightness) to 10 (worst tightness). The status of pain, which included shoulder pain, knee pain, low back pain, calf pain, Achilles tendon pain, and foot pain, were also recorded by numeric rating scale. The questions were scored from 0 (no pain) to 10 (worst pain imaginable). After completion of the questionnaire, a 12-year-experience physiatrist (rehabilitation physician) who specialized in foot disorders conducted a physical examination. Patients were in supine position. The physiatrist moved the patient's ankle joint in dorsiflexion motion while the knee was in fully extended position and subtalar joint was in neutral position. Then the physiatrist measured the ankle dorsiflexion passive range of motion (PROM) by goniometer. Next, the physiatrist asked the patients to move their ankle joint in dorsiflexion motion as much as they can while the knee was in fully extended position. After that, the physiatrist measured the ankle dorsiflexion active range of motion (AROM) by goniometer. Finally, the physiatrist palpated the patient's calf muscle to find the trigger points, tender points, and taut bands in the calf muscle.

The patients were then randomized into one of two groups by a coordinator. The randomization code was developed using a computer random number generator to select random permuted blocks. The details of the series were unknown to any of the investigators and coordinator and were contained in a set of sealed envelopes, each bearing on the outside only a number. The patients had an equal probability of assignment to each of the groups.

Patients who were randomized to a study group received a proper size of calf stretching box, the box that its height was about 1/3 of the patient's foot length, and the instructions in using calf stretching box exercise program from a foot clinic nurse. They were instructed to put the foot of their affected leg on round side of the box and lean the body forward with knee straight until they felt stretching on their calf and hold in that position for at least 1 minute. They were instructed to avoid overstretching and stop performing exercise if they had severe pain.

Patients who were randomized to a control group received the instructions of "leaning into the wall" exercise program from a foot clinic nurse. Patients were instructed to perform this exercise by standing and leaning into the wall with the affected leg placed behind the contralateral leg. Patient were instructed to place their hands on the wall to help their balance, bend the front knee while keeping the back knee straight and the heel firmly on the ground until they felt stretching on their calf and hold in that position for at least 1 minute. They were instructed to avoid overstretching and stop performing exercise if they had severe pain.

Patients in both groups were given a written protocol of each stretching program. They were asked to hold the stretch for at least 1 minute and to perform the stretching program at least two times per day, every day for two weeks. For the main outcome, the compliance of performing calf stretching exercise measurement, the patients were asked to record the real frequency (times per day) and the real duration (seconds per time recording by a stop watch) of their performing exercise in a log book everyday. The patients were also asked to record the complications in the logbook every day.

Patients returned at two weeks for a follow-up physical examination and completion of the follow-up questionnaire. The follow-up questionnaire included the status of calf muscle tightness and pain during or after performing the calf muscle stretching. It also included questions about the convenience and easiness of performing the exercise recorded by numeric rating scale and the intent of performing this exercise in the future. The follow-up physical examination, included a degree of ankle dorsiflexion range of motion, number of trigger points, tender points, and taut bands of calf muscle, was conducted by the same physiatrist who did not know which group of the patients were.

The study protocol was approved by the Siriraj Institutional Review Board and was supported by Siriraj Routine to Research Management Fund.

Statistical analysis

Statistical analysis was done with SPSS version 11.5.

The qualitative data such as gender, marital status, educational level, occupation, monthly income, co-morbid disease, hours of free time, habit of performing exercise and previous known history of calf stretching methods were reported in percentage. Continuous variables, such as age, degree of ankle dorsiflexion range of motion were calculated in mean and standard deviation. The compliance of performing exercise was calculated in mean, standard deviation, and median (range). The severity of calf muscle tightness, pain, convenience and ease of performance of the exercise, which were recorded by numeric rating scale, were calculated in median (range). Number of trigger points, tender points, and taut bands of calf muscle were calculated in median (range). T-test was used to explore the relationship of quantitative data that has normal distribution and Mann-Whitney test was used to explore the relationship of quantitative data that has non-normal distribution. Chi-Square test and Fisher's Exact test was used to explore the relationship of quantitative data.

Results

Of the 80 patients randomized into the study, seventy-six returned for a follow-up evaluation after two weeks and completed the study, giving an overall attrition rate of 5%. When categorized by study group, the attrition rate was equal in two groups (two; 5%) (Fig. 3).

Table 1 summarizes the baseline characteristics of the subjects who completed the study. The analysis of baseline measures for the two groups revealed that they were very similar with regard to age, gender, marital status, educational level, occupation, monthly income, co-morbid disease, hours of free time, habits of performing exercise and previously known calf stretching method. The analysis of the baseline characteristics revealed that there were no significant differences between the two groups ($p > 0.05$).

Table 2 summarizes the baseline status of calf muscle tightness and pain during one week

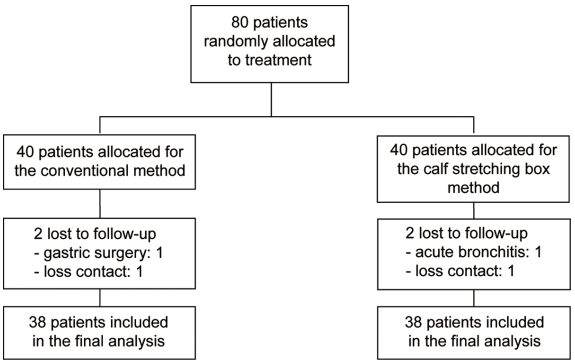

Fig. 3 Flow of participants

Table 1. Demographic data

Characteristics	Study group Number (percent)	Control group Number (percent)	p-value
Age (mean (SD)/years)	56.84 (7.35)	59.71 (9.69)	0.150
Gender			
Male/female	3 (7.9)/35 (92.1)	3 (7.9)/35 (92.1)	1.000
Marital status			
Single/married	16 (42.1)/22 (57.9)	20 (52.6)/18 (47.4)	0.491
Educational levels			
Primary school	4 (10.5)	9 (23.7)	0.233
Secondary school	0	1 (2.6)	
Tertiary school	5 (13.2)	9 (23.7)	
Certification	3 (7.9)	3 (7.9)	
Bachelor degree	16 (42.1)	11 (28.9)	
Master & PhD	10 (26.3)	5 (13.2)	
Occupation			
Unemployed	6 (15.8)	14 (36.8)	0.108
Retired	11 (28.9)	8 (21.1)	
Government employees	13 (34.2)	11 (28.9)	
Working in private companies	7 (18.4)	2 (5.3)	
Others	1 (2.6)	3 (7.9)	
Monthly incomes (Baht)			
Less than 5,000	3 (7.9)	3 (7.9)	0.494
5,000-10,000	5 (13.2)	11 (28.9)	
10,001-30.000	15 (39.5)	13 (39.5)	
30,001-50,000	10 (26.3)	6 (15.8)	
More than 50,000	5 (13.2)	5 (13.2)	
Co-morbid disease			
No	2 (5.3)	4 (10.5)	0.674
Yes	36 (94.7)	34 (89.5)	
Shoulder pain	20 (52.6)	16 (42.1)	0.491
Low back pain	26 (68.4)	17 (44.7)	0.064
Knee pain	23 (60.5)	19 (50.0)	0.489
Foot pain	21 (55.3)	19 (50.0)	0.818
Poor balance	7 (18.4)	12 (31.6)	0.289
Others	8 (21.1)	10 (26.3)	0.787
Free time (hours per day)			
None	0	2 (5.3)	0.278
< 1	4 (10.5)	1 (2.6)	
1-2	10 (26.3)	10 (26.3)	
3-4	15 (39.5)	11 (28.9)	
5-6	6 (15.8)	6 (15.8)	
> 6	3 (7.9)	8 (21.1)	
How to stretch			
Yes/no	24 (63.2)/14 (36.8)	26 (68.4)/12 (31.6)	0.809
Having regular exercise			
Yes/no	23 (60.5/15 (39.5)	19 (50.0)/19 (50.0)	0.489
Calf side			
Right/left	18 (47.4)/20 (52.6)	24 (63.2)/14 (36.8)	0.249

before study and baseline ankle dorsiflexion active and passive range of motion (AROM, PROM), number of trigger points, tender points, and taut bands of calf muscle. The analysis of baseline measures revealed that there were no significant differences between the two groups regard to calf muscle tightness, knee pain, calf pain, Achilles tendon pain, ankle dorsiflexion both active and passive range of motion, and number

Table 2. Baseline status of calf muscle tightness and pain during one week before study and baseline of number of taut band, tender point, trigger point and ankle dorsiflexion range of motion

	Median (min, max)		p-value
	Study group	Control group	
Calf muscle tightness	7 (5, 10)	7 (3, 10)	0.622
Shoulder pain	4.5 (0, 10)	1.5 (0, 10)	0.021*
Knee pain	4 (0, 10)	4 (0, 10)	0.929
Low back pain	5 (0, 10)	3 (0, 10)	0.023*
Calf muscle pain	5 (0, 10)	5 (0, 10)	0.690
Achilles tendon pain	1 (0, 8)	0.5 (0, 10)	0.813
Foot pain	4.5 (0, 10)	2 (0, 10)	0.039*
Taut band (point)	1.5 (0, 3)	2 (0, 4)	0.800
Trigger point (point)	0 (0, 4)	0 (0, 3)	0.170
Tender point (point)	0 (0, 3)	0.5 (0, 3)	0.500
Ankle dorsiflexion ROM AROM/PROM (degree)	7.39 (5.78)/12.32 (5.73)	8.08 (4.77)/12.08 (5.17)	0.58/0.85

Calf muscle tightness and pain were recorded by numeric rating scale
Ankle dorsiflexion range of motions were recorded in mean (SD)
ROM = range of motion
AROM/PROM = active and passive range of motion

Table 3. Compliance with performance of the stretching exercise

Frequency/duration	Mean (SD)		Median (min, max)		p-value	95% confidence interval
	Study group	Control group	Study group	Control group		
Days/week	6.58 (0.60)	5.89 (1.65)	7 (5, 7)	6.5 (0.5, 7)	0.018*	0.12-1.27
Times/day	2.54 (0.49)	2.11 (0.78)	2.7 (1.4, 3)	2 (1.0, 3.9)	0.060	0.13-0.72
Seconds/time	90.35 (55.56)	65.86 (40.71)	63.7 (36.9, 249.0)	60 (6.7, 250.0)	0.032*	2.18-46.78
Minutes/2 weeks	52.21 (38.57)	28.72 (21.60)	42 (13.7, 174.3)	24.98 (0.3, 118)	0.002*	9.13-37.85
Seconds/2 weeks	3,132.86 (2,314.25)	1,723.44 (1,296.46)	2,520 (819.9, 10,458.0)	1,498.75 (19.9, 7,079.9)	0.002*	548.09-2,270.75

of trigger points, tender points, and taut bands of calf muscle ($p > 0.05$). Shoulder pain, foot pain, and low back pain demonstrated significant differences between the two groups. The study group had a higher numeric rating scale of shoulder pain, foot pain, and low back pain than the control group.

Primary outcome

A summary of the compliance of performing the stretching exercise is presented in Table 3. The study group reported higher frequency (days per week and times per day) and longer duration of performing the exercise (seconds per time and seconds per two weeks) than the control group. The analysis of the compliance revealed that there were significant differences between the two groups in all parameters except the frequency recorded in times per day.

Secondary outcome

The severity of calf muscle tightness and the complications, which consisted of shoulder pain, knee pain, calf muscle pain, Achilles tendon pain and

Table 4. Pre and post intervention difference** of calf muscle tightness, pain, number of taut band, number of tender point, number of trigger point and ankle dorsiflexion range of motion

	Median* (min, max)		p-value
	Study group	Control group	
Calf muscle tightness (recorded by numeric rating scale 0-10)	4 (1, 10)	2 (-2, 8)	0.004*
Pain (recorded by numeric rating scale 0-10)			
Shoulder pain	3 (-3, 7)	0 (-5, 8)	0.000*
Knee pain	1 (-3, 7)	-5 (-6, 9)	0.000*
Low back pain	2 (-6, 7)	0 (-9, 8)	0.000*
Calf muscle pain	2.5 (-3, 9)	0 (-7, 9)	0.013*
Achilles tendon pain	0 (-8, 7)	0 (-8, 9)	0.134
Foot pain	1 (-4, 9)	0 (-5, 6)	0.129
Number of points (point)			
Taut band	1 (-1, 3)	0 (-1, 3)	0.665
Trigger point	0 (-1, 3)	0 (-1, 3)	0.846
Tender point	0 (-1, 3)	0 (-2, 2)	0.185
Ankle dorsiflexion range of motion (ROM) (degree)***			
AROM	-4.34 (7.11)	-3.08 (5.05)	0.269
PROM	-5.59 (5.43)	-4.68 (6.04)	0.429

** Calculated by pre-intervention score minus post-intervention score (Minus value means pre-intervention score is less than post-intervention score)
*** Ankle dorsiflexion range of motions were recorded in mean (SD)
AROM = active range of motion
PROM = passive range of motion

foot pain, were reported in the median of the pre and post intervention difference by numeric rating scale. The study group reported more decrease of calf muscle tightness than the control group. The analysis revealed that there were significant differences of the severity of calf muscle tightness between the two groups ($p = 0.004$). For the complications, although the study showed both increasing (presented in minus sign) and decreasing of the pain numeric rating scale in both groups, the study group showed fewer pain complications than the control group. Shoulder pain, knee pain, low back pain and calf muscle pain demonstrated significant differences between the two groups ($p > 0.02$) (Table 4). The difference of numbers of taut bands, trigger points, and tender points (reported in median) and the ankle range of motion (reported in mean) were summarized in Table 4. The analysis revealed that there were no significant differences between the two groups.

Table 5 shows the median of numeric rating scale of convenience and of the easiness to perform the exercise. The study group reported greater scale of the convenience and the easiness to perform the exercise than the control group. The analysis revealed that there were significant differences between the two groups ($p < 0.02$).

Table 5. Convenience and easiness of performing the exercise

	Median* (min, max)		p-value
	Study group	Control group	
Convenience	9 (2, 10)	7 (1, 10)	0.008*
Easiness	9 (1, 10)	8 (1, 10)	0.019*

Convenience and easiness to perform the exercise were recorded by numeric rating scale

For the continuous of performing the stretching exercise, most patients in both groups will continue their stretching exercise program. Only two patients in the study group and six patients in the control group will not continue their program. There was no significant difference of the continuous of performing the stretching exercise between the two groups (Table 6).

Table 6. Continuous intense of performing the stretching exercise in the future

	Study group Number (percent)	Control group Number (percent)	p-value
Yes	31 (81.6)	26 (68.4)	0.282
May be	5 (13.2)	6 (15.8)	
No	2 (5.3)	6 (15.8)	

Discussion

In the present study, the population was the one who was more than forty-five years old who had some co-symptoms of shoulder pain, knee pain, low back pain, foot pain, or poor balance. The result revealed that the study group has higher frequency and longer duration of performing exercise than the control group. The reasons of the better compliance may be as follow. (1) Patients had fewer pain complications, especially in shoulder pain, knee pain, and low back pain because they had only to put the foot of their affected leg on the box and lean the body forward and they did not need to reach out the arms to the wall or bend the front knee. And (2) stretching the calf muscle with the calf stretching box was easier and more convenient to perform because the patients need only put one foot on the box. They can stand on the other foot and they did not need to reach out the arms to the wall to maintain their balance. Thus, they are able to perform this exercise while they were looking at television and had free hands.

The study group reported more decrease of calf muscle tightness than in the control group because they had better compliance than the control group. The result showed no significant differences of the difference of numbers of taut bands, trigger points and tender points and degrees of ankle range of motion between the two groups. The reasons of this result may be the tightness of calf muscle was a subjective finding and this feeling was sustained only after stretching for a while. When the patients stood or walked a lot, the muscle can re-tighten and thus needs the effective stretching again. Only sixty seconds of calf muscle stretching can only decrease symptoms and cannot decrease numbers of taut bands, trigger points and tender points or increase ankle range of motion significantly[11,12].

Although using calf stretching box showed an increase of the patient's compliance greater than the conventional method, the means of duration in the present study in both groups were more than the proper program (52.21 and 28.72 minutes per two weeks in the study group and in the control group, respectively). It may be that because the patients had to complete their logbook, it reminded them to perform the stretching exercise.

As for the continuance of performing the exercise in the future, most patients in both groups claimed they would continue their stretching exercise program. This proved that both calf stretching techniques were effective in decreasing tightness and caused not serious complications. However, the present study demonstrated that stretching with calf stretching box caused less severity of complications.

The authors thought that both methods of calf stretching exercise were effective. If the patient had no underlying condition, both methods were practicable. For the patients who had some conditions such as knee osteoarthritis, lumbar spondylosis or shoulder tendinitis, using calf stretching box may be an alternative method for decreasing their complications and increasing their compliance. As the cost for one calf stretching box was only 6 dollars, it is not too expensive to be borne by the patient.

The limitation of the present study was the duration. The effectiveness of the stretching exercise was related to the compliance. In the present study, the authors recorded the compliance of performing exercise for only two weeks. In the real situation, the patients needed to perform the exercise until their problems resolved which usually took longer time. For the future study, the authors recommended to study in the specific disease in order to specify duration of the study related to the disease.

Conclusion

Stretching calf muscle with calf stretching box can increase compliance, decrease calf muscle tightness and decrease complications when compared with the conventional exercise method.

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ประสิทธิผลของการใช้อุปกรณ์ยืดกล้ามเนื้อน่องต่อความถี่และระยะเวลาในการยืดกล้ามเนื้อน่อง

นวพร ชัชวาลพาณิชย์, กุลภา ศรีสวัสดิ์, อัจฉรา สุวรรณนาคินทร์

วัตถุประสงค์หลัก: *เพื่อศึกษาประสิทธิผลของการใช้อุปกรณ์ยืดกล้ามเนื้อน่องในแง่ของการเพิ่มการใช้ (compliance) ในการยืดกล้ามเนื้อน่องเทียบกับการยืดกล้ามเนื้อน่องแบบเดิม*

วัตถุประสงค์รอง: *เพื่อศึกษาประสิทธิผลของการใช้อุปกรณ์ยืดกล้ามเนื้อน่องในการลดอาการ กล้ามเนื้อน่องตึง และลดผลแทรกซ้อนจากการยืดกล้ามเนื้อเทียบกับการยืดกล้ามเนื้อน่องแบบเดิม*

รูปแบบการศึกษา: *การศึกษาโดยการสุ่มและมีกลุ่มเปรียบเทียบ*

สถานที่ทำการศึกษา: *ภาควิชาเวชศาสตร์ฟื้นฟู โรงพยาบาลศิริราช*

กลุ่มประชากร: *ผู้ที่มีกล้ามเนื้อน่องตึง อายุ 45 ปีขึ้นไป จำนวน 80 คน*

วัสดุและวิธีการ: *สุ่มเลือกผู้ป่วยเป็น 2 กลุ่ม คือ กลุ่มทดลองและกลุ่มควบคุม กลุ่มควบคุม ยืดกล้ามเนื้อน่องแบบเดิม โดยให้ผู้ป่วยยืนหันหน้าเข้าหากำแพง ใช้มือประคองไว้กับกำแพงเพื่อช่วยทรงตัว วางเท้าที่ต้องการยืดกล้ามเนื้อน่องไว้ด้านหลัง งอเข่าด้านหน้าลงมากที่สุดเท่าที่จะทำได้ โดยขาด้านหลังตึง ส้นเท้าชิดพื้นตลอดเวลา กลุ่มทดลองยืดกล้ามเนื้อโดยการใช้อุปกรณ์ยืดกล้ามเนื้อน่อง โดยให้ผู้ป่วยวางเท้าพาดกับอุปกรณ์ยืดกล้ามเนื้อน่อง โดยให้ขอบของอุปกรณ์ยืดกล้ามเนื้อน่อง อยู่ประมาณ proximal ต่อแนว metatarsal bone เหยียดเข่าตึง แล้วโน้มตัวมาข้างหน้าจนรู้สึกตึงที่กล้ามเนื้อน่องโดยแจ้งผู้ป่วยทั้ง 2 กลุ่ม ให้ยืดกล้ามเนื้ออย่างน้อยวันละ 2 ครั้ง ครั้งละ 1 นาที เป็นเวลา 2 สัปดาห์ โดยมีการบันทึกความถี่ (ต่อวัน) และระยะเวลาในการยืดกล้ามเนื้อ (วินาทีต่อครั้ง) รวมทั้งอาการแทรกซ้อนจากการยืดกล้ามเนื้อในสมุดบันทึกทุกวัน*

ผลการศึกษา: *มีผู้ที่เข้าร่วมการศึกษาจนจบจำนวน 76 คน เป็นกลุ่มทดลอง และกลุ่มควบคุมอย่างละ 38 คน ทั้งสองกลุ่มมีข้อมูลพื้นฐานใกล้เคียงกัน กลุ่มทดลองมีความถี่ และระยะเวลาในการยืดกล้ามเนื้อน่องมากกว่ากลุ่มควบคุม และมีอาการแทรกซ้อนจากการยืดกล้ามเนื้อ (อาการปวดไหล่ ปวดเข่า ปวดหลังบริเวณเอว และปวดน่อง) น้อยกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ อย่างไรก็ตาม ไม่พบความแตกต่างของการเปลี่ยนแปลงของจำนวน taut band, trigger point, tender point และพิสัยการเคลื่อนไหวของข้อเท้าระหว่างกลุ่มทดลอง และกลุ่มควบคุม*

สรุป: *การยืดกล้ามเนื้อน่องโดยการใช้อุปกรณ์ยืดกล้ามเนื้อน่อง สามารถเพิ่มความถี่ และระยะเวลาในการยืดกล้ามเนื้อน่อง ลดอาการกล้ามเนื้อน่องตึง และลดอาการแทรกซ้อนจากการยืดกล้ามเนื้อเมื่อเทียบกับการยืดกล้ามเนื้อน่องแบบเดิม*