

Managing Knee Pain Due To Venous And Lymphatic Congestion With A Home Program Of Manual Lymphatic Drainage And Over- the-counter Compression Stockings

**Loraine Lovejoy-Evans, PT, DPT, CLT-Foeldi
Kathie Hummel-Berry, PT, PhD**

ABSTRACT:

- ❑ **Purpose/Hypothesis** : Chronic venous and lymphatic congestion may contribute to knee pain
- ❑ Complete decongestive therapy (CDT) is used to manage lymphatic congestion. CDT includes:
 - skin care
 - Education
 - manual lymphatic drainage (MLD)
 - specific exercise
- ❑ Elements of CDT may be effective to manage related knee pain and reduced function
- ❑ Patient-directed interventions are useful with limited health care resources

Purpose / Number of Subjects:

- ❑ **Purpose:** To investigate the effectiveness of exercise versus over-the-counter (OTC) compression garments and self-MLD to reduce impairment and increase function among patients with knee pain related to venous and lymphatic congestion
- ❑ **Number of Subjects :** Twenty-nine consecutive patients with venous and lymphatic congestion, plus knee pain

Materials/Methods

- ❑ ABBA single subject design with repeated enrollment

- ❑ Consecutive adult patients with venous and lymphatic lower extremity congestion and functionally limiting knee pain were enrolled
- ❑ Patients with contraindications to CDT were excluded
- ❑ Interventions:
 - Two weeks of specific exercises
 - Two weeks of wearing 20-30mmHg OTC knee-high compression stockings during all waking hours plus self-MLD
 - In the final phase of the study treatment was withdrawn for two weeks

Special Thanks

BSN-Jobst Medical for
supplying compression
stockings

Measurements:

- ❑ Measurements take at the beginning of the study and repeated at the end of each two-week phase of the study:
 - Ankle, calf and figure-of-8 girth in cm
 - Knee active range of motion
 - Body weight
 - Pain intensity (visual analog scale)
 - Function (Lysholm score)
 - Quality of life (Medical Outcomes Study Short-Form 36)
- ❑ Measurements were repeated until there were three measurements within 5 millimeters for girth and within 5 degrees for active range of motion to establish baseline

Conclusions

- ❑ After a home program including use of OTC compression garments with self MLD
- ❑ Subjects demonstrated:
 - Reduced pain intensity
 - Reduced girth
 - Increased function

Descriptive Statistics

- **Age:**

- Minimum: 42

- Maximum: 88

- **Age Ranges:**

- 40-50: 4

- 50-60: 5

- 60-70: 5

- 70-80: 12

- 80-90: 3

- **Gender:**

- Female 17

- Male 12

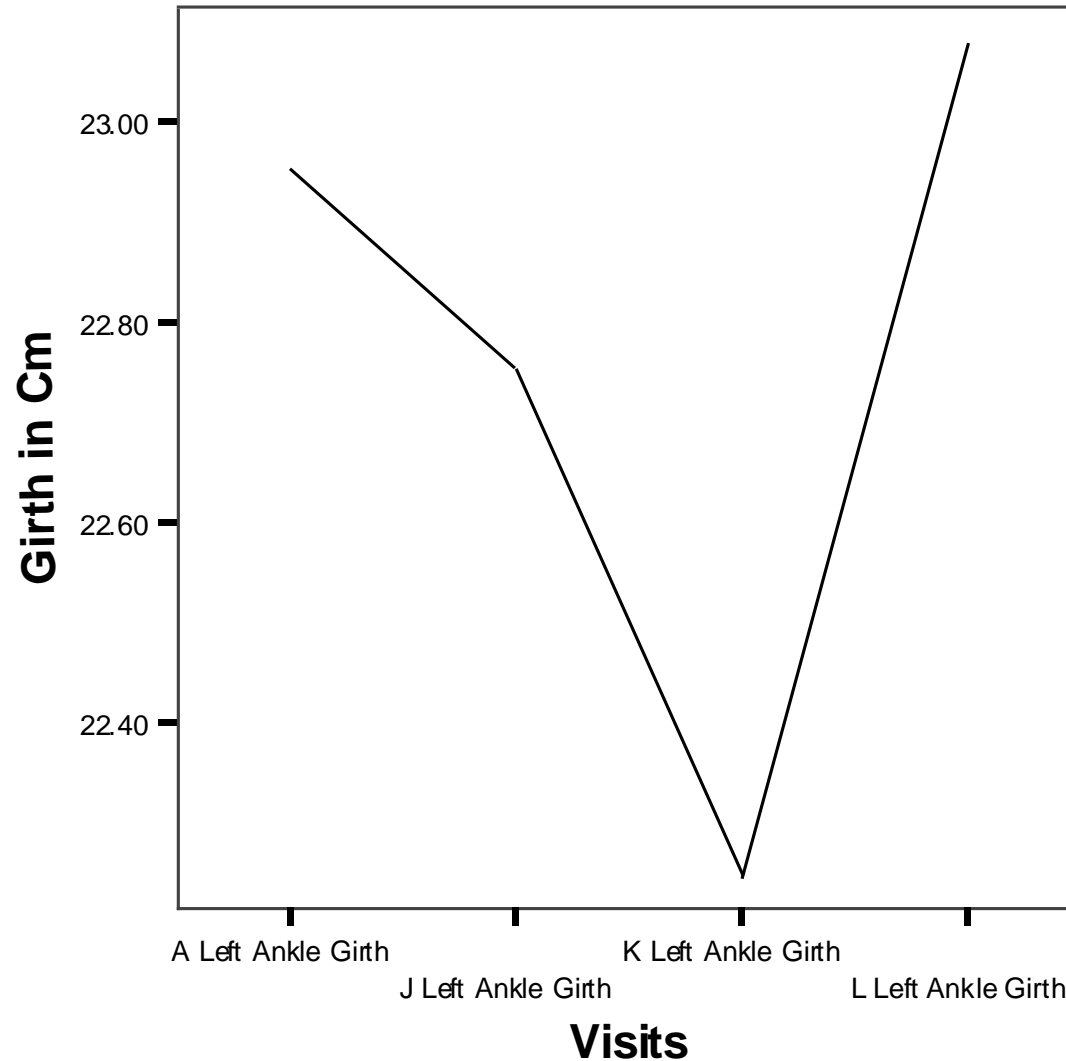
- **Marital Status:**

- Single 3

- Married 22

- Other 4

Left Ankle Girth



Dot/Lines show Means

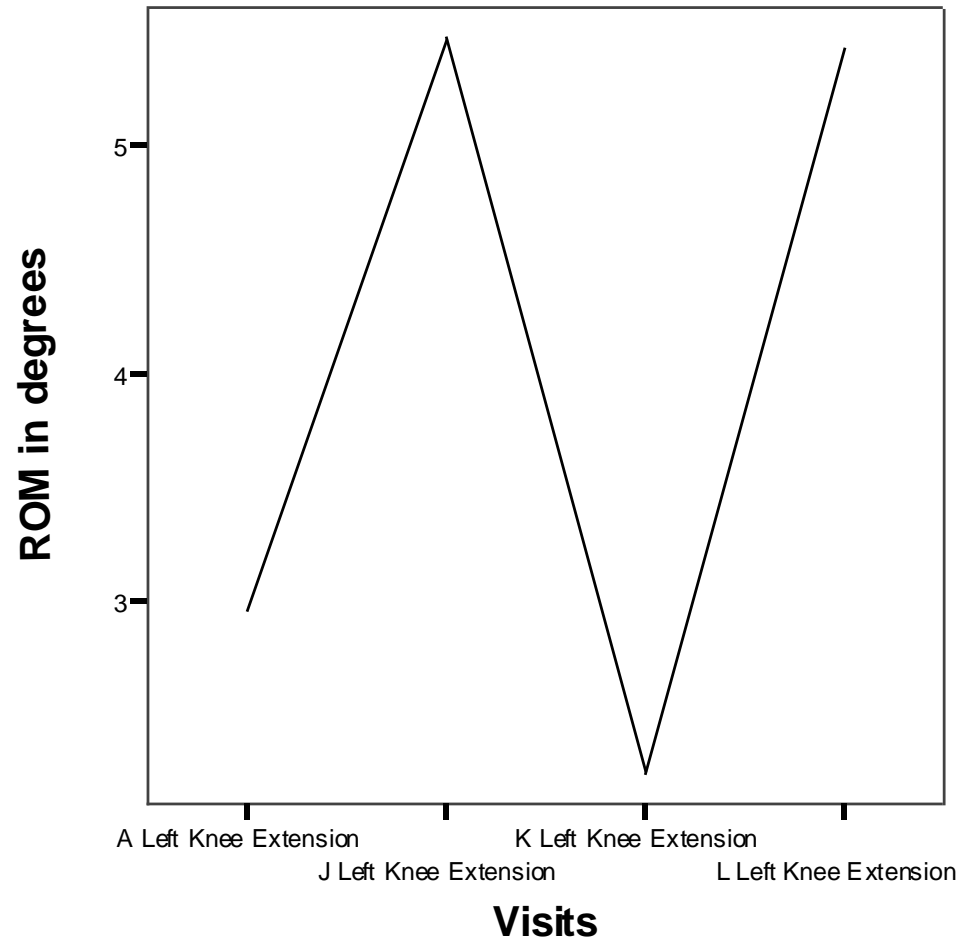
*****Lower # better**

Left Ankle Girth in cm

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	22.87 (3.55)	22.75 (3.21)	0.434	0.52	27
Socks+MLD	22.81 (3.33)	22.25 (3.28)	21.744	0	25
Withheld rx	22.25 (3.28)	23.08 (3.82)	16.394	0	25

Left Knee Extension ROM

0=full extension

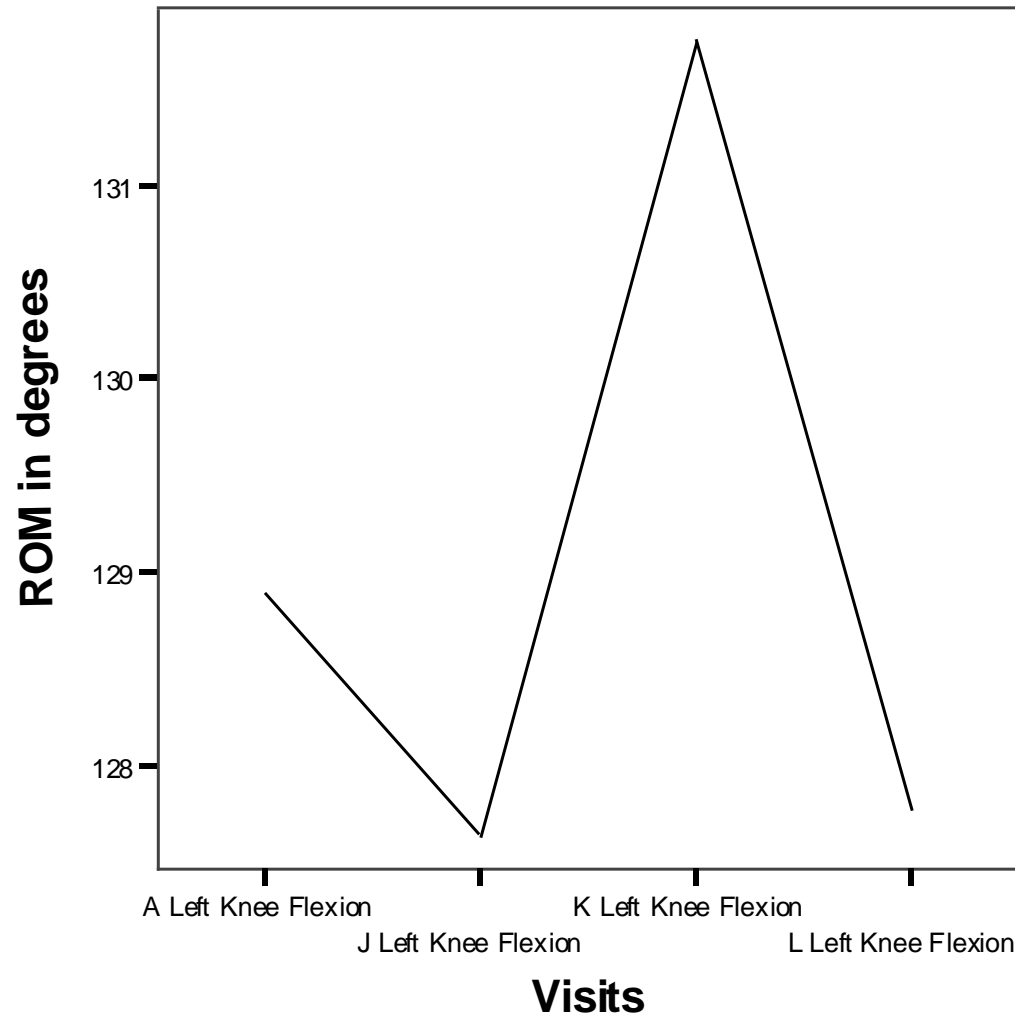


*****Lower # better**

Left Knee Extension ROM in degrees

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	3.07 (5.25)	5.48 (7.74)	3.979	0.06	27
Socks+MLD	5.60 (7.96)	2.24 (4.27)	6.54	0.02	25
Withheld rx	2.24 (4.27)	5.44 (7.94)	9.722	0.01	25

Left Knee Flexion ROM



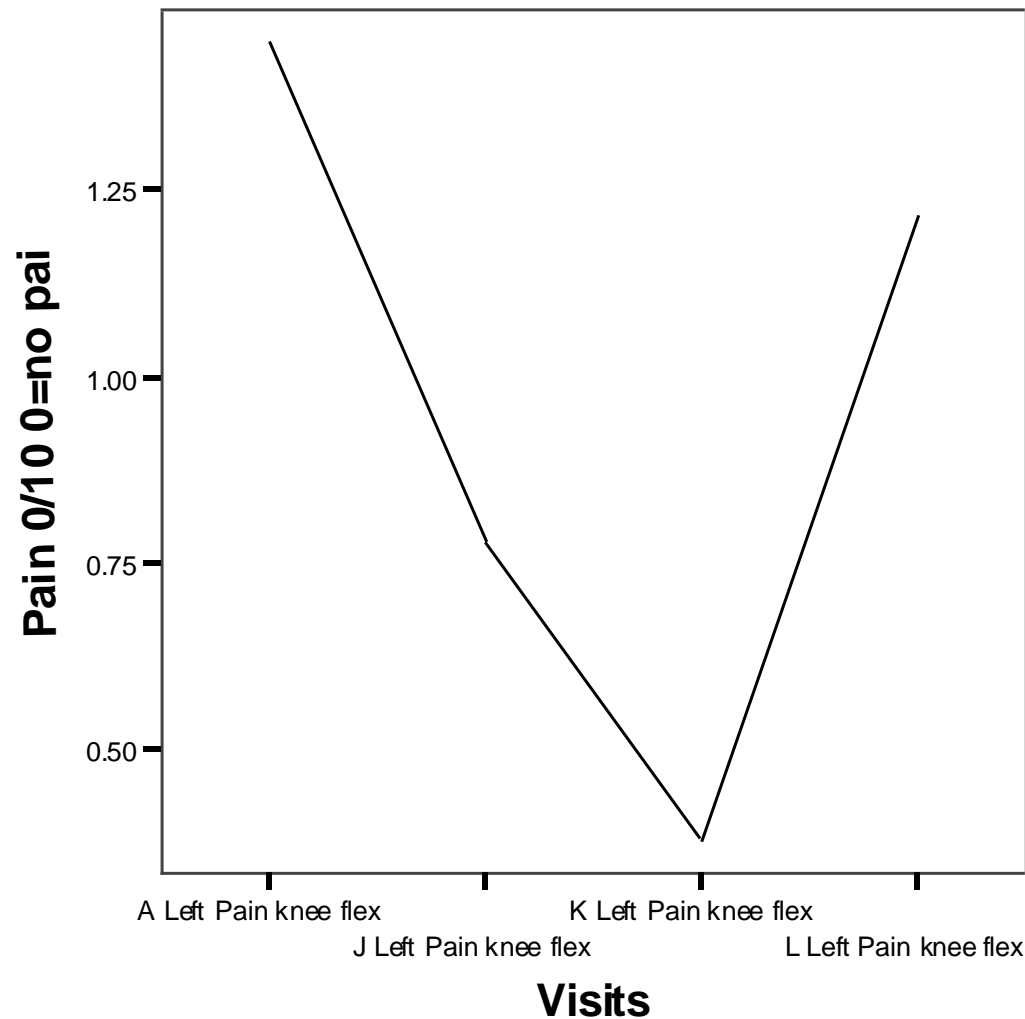
Dot/Lines show Means

*****Higher # better**

Left Knee Flexion ROM in degrees

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	128.56 (7.23)	127.63 (8.04)	0.643	0.43	27
Socks+MLD	127.36 (8.29)	131.76 (6.50)	17.183	0	25
Withheld rx	131.76 (6.50)	127.76 (9.02)	5.955	0.02	25

Left Knee Pain with Flexion

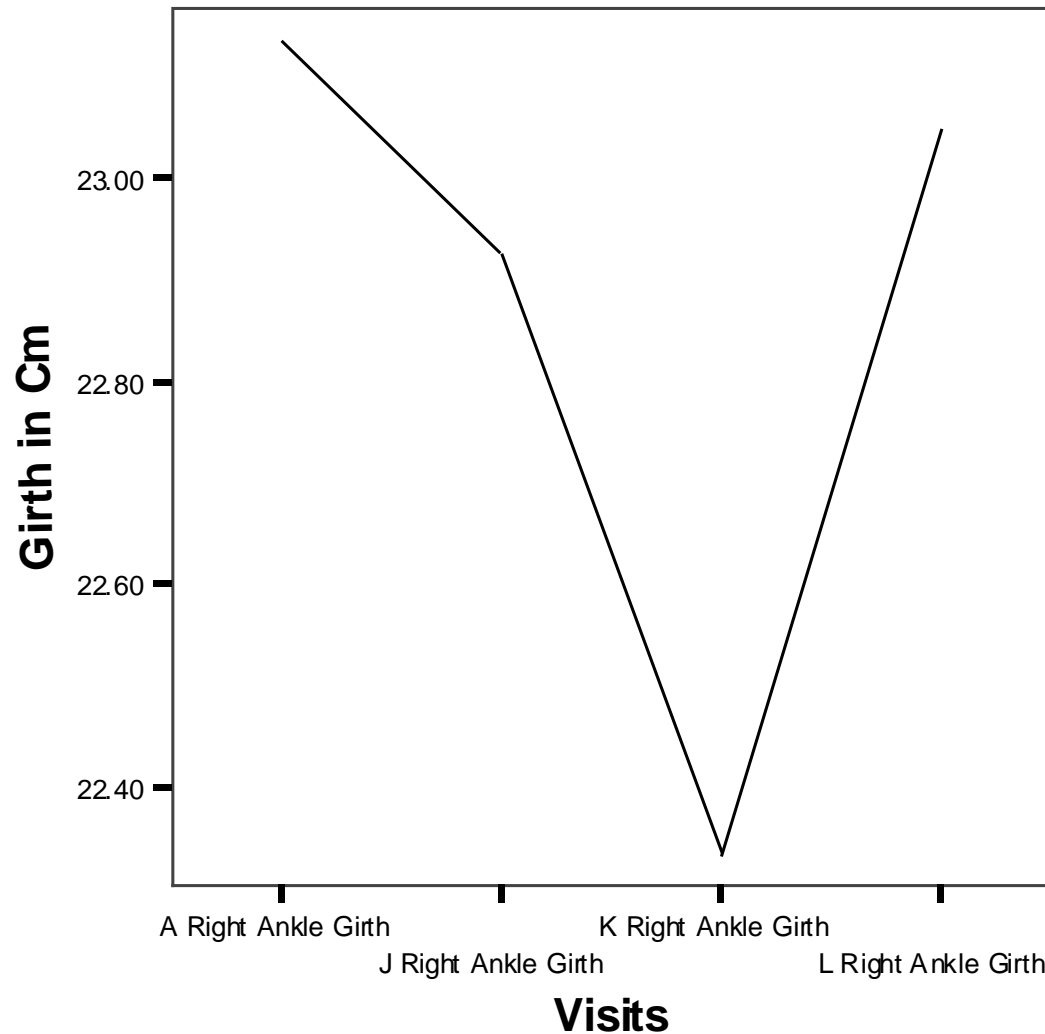


*****Lower # better**

Left Knee Pain with Flexion 0-10/10

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	1.41 (2.39)	.78 (1.58)	4.774	0.04	28
Socks+MLD	.72 (1.57)	.38 (1.03)	1.719	0.2	25
Withheld rx	.38 (1.03)	1.22 (1.89)	4.764	0.04	25

Right Ankle Girth

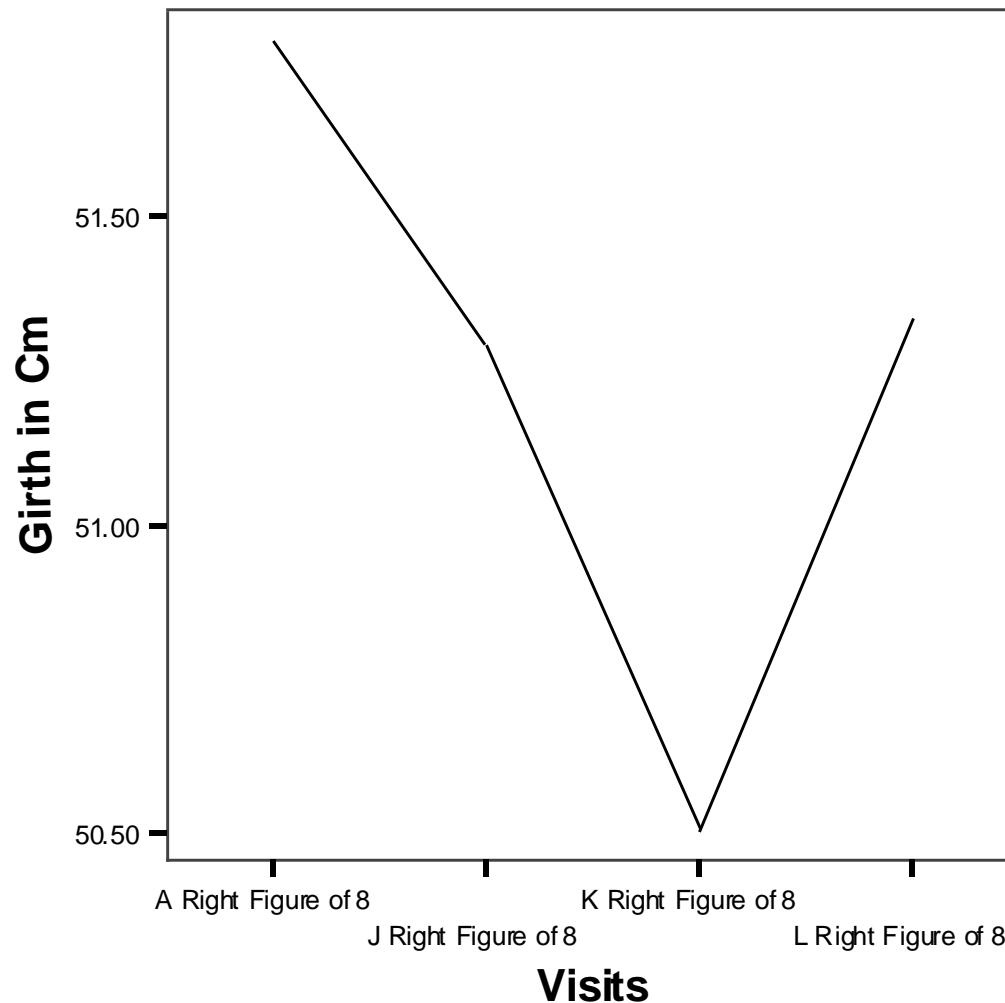


*****Lower # better**

Right Ankle Girth in cm

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	23.13 (3.78)	22.93 (3.54)	1.427	0.24	27
Socks+MLD	22.94 (3.68)	22.34 (3.69)	43.869	0	25
Withheld rx	22.34 (3.69)	23.05 (3.90)	33.677	0	25

Right Figure of 8 Girth



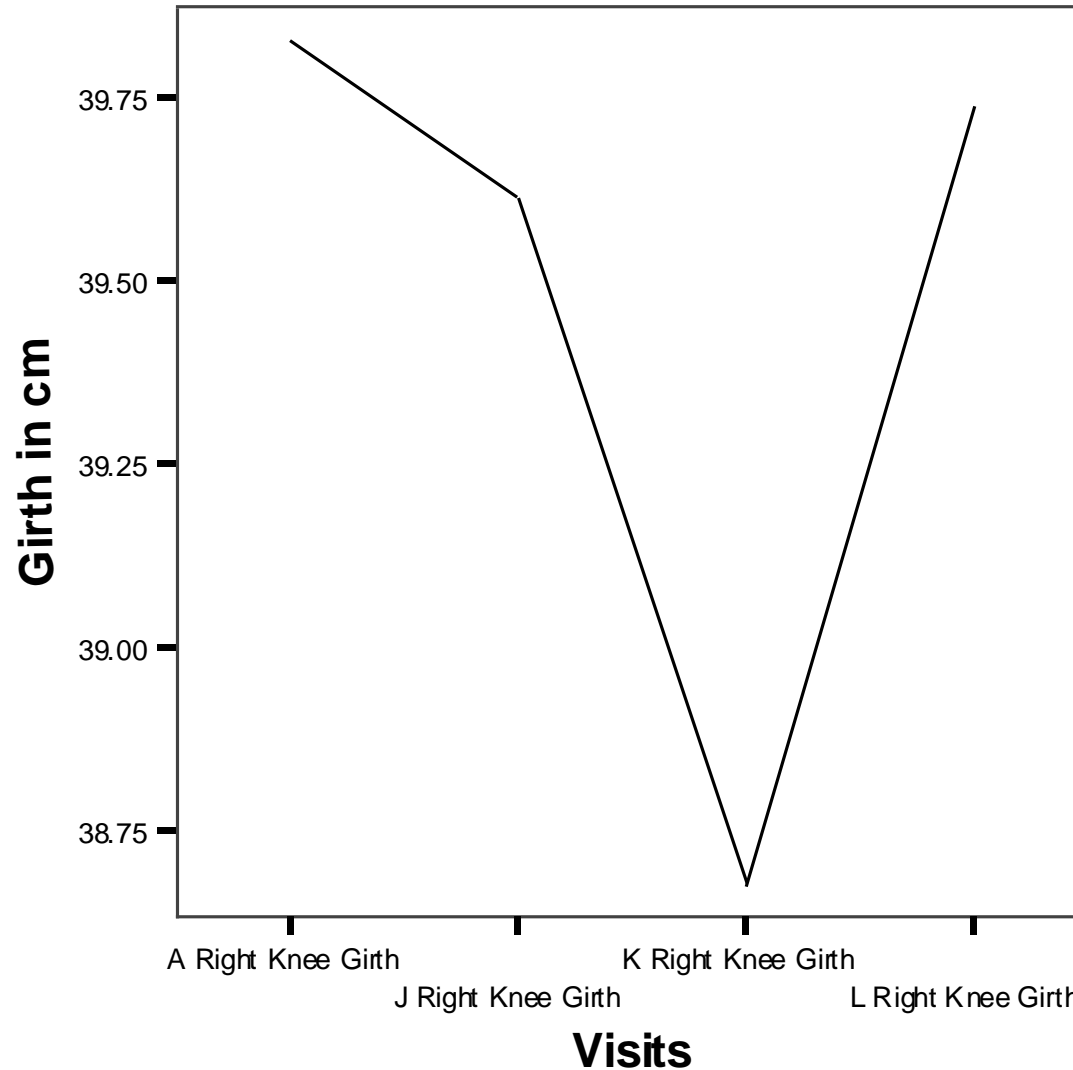
Dot/Lines show Means

*****Lower # better**

Right Figure of 8 Girth in cm

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	51.59 (6.32)	51.29 (5.67)	1.431	0.24	27
Socks+MLD	51.25 (5.89)	50.51 (5.94)	39.43 7	0	25
Withheld rx	50.51 (5.94)	51.34 (6.21)	29.17 8	0	25

Right Calf Girth



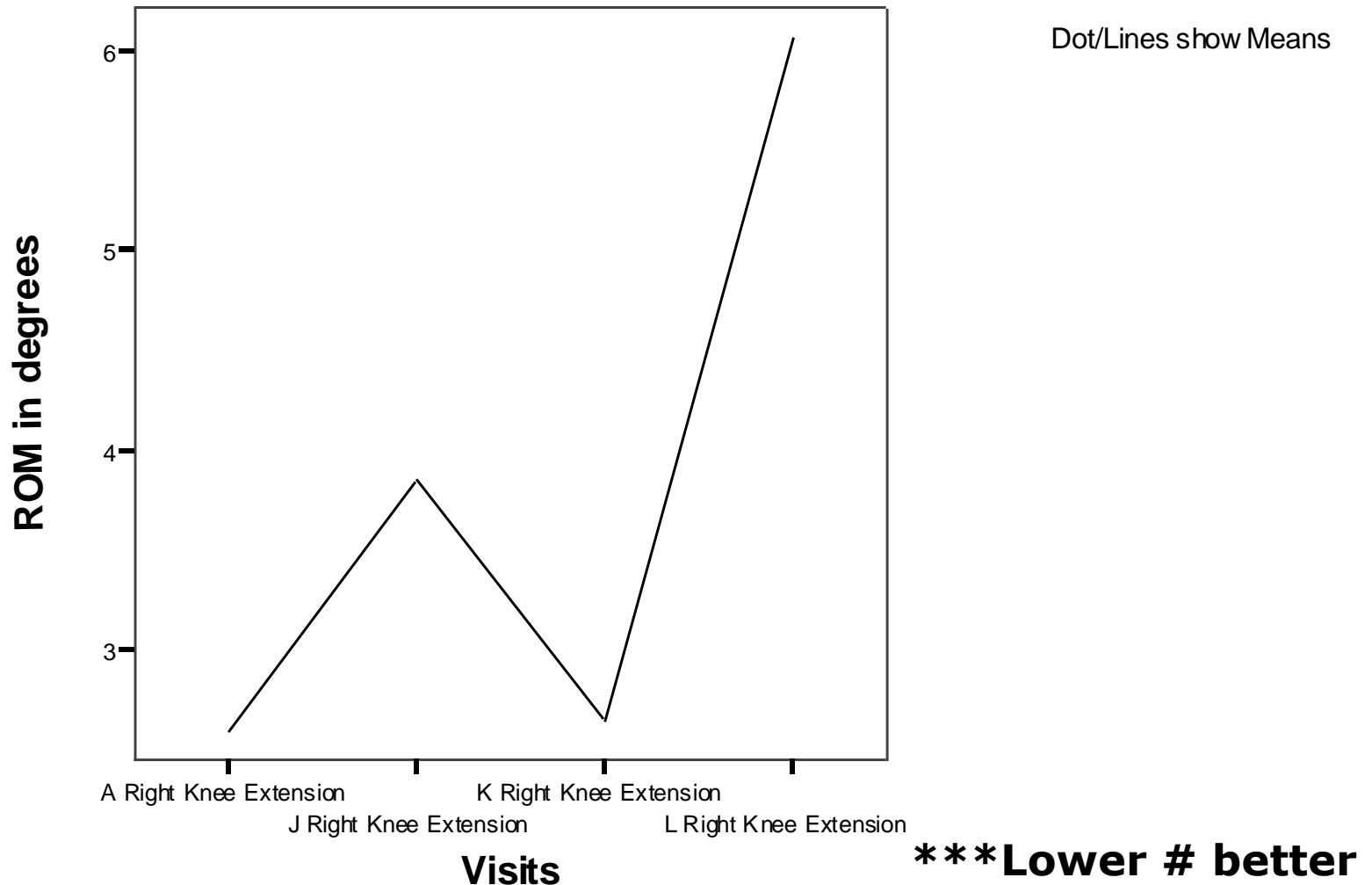
Dot/Lines show Means

*****Lower # better**

Right Calf Girth in cm

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	39.91 (5.23)	39.61 (4.94)	4.213	0.5	27
Socks+MLD	39.64 (5.08)	38.68 (5.24)	32.604	0	25
Withheld rx	39.68 (5.24)	39.74 (5.25)	40.353	0	25

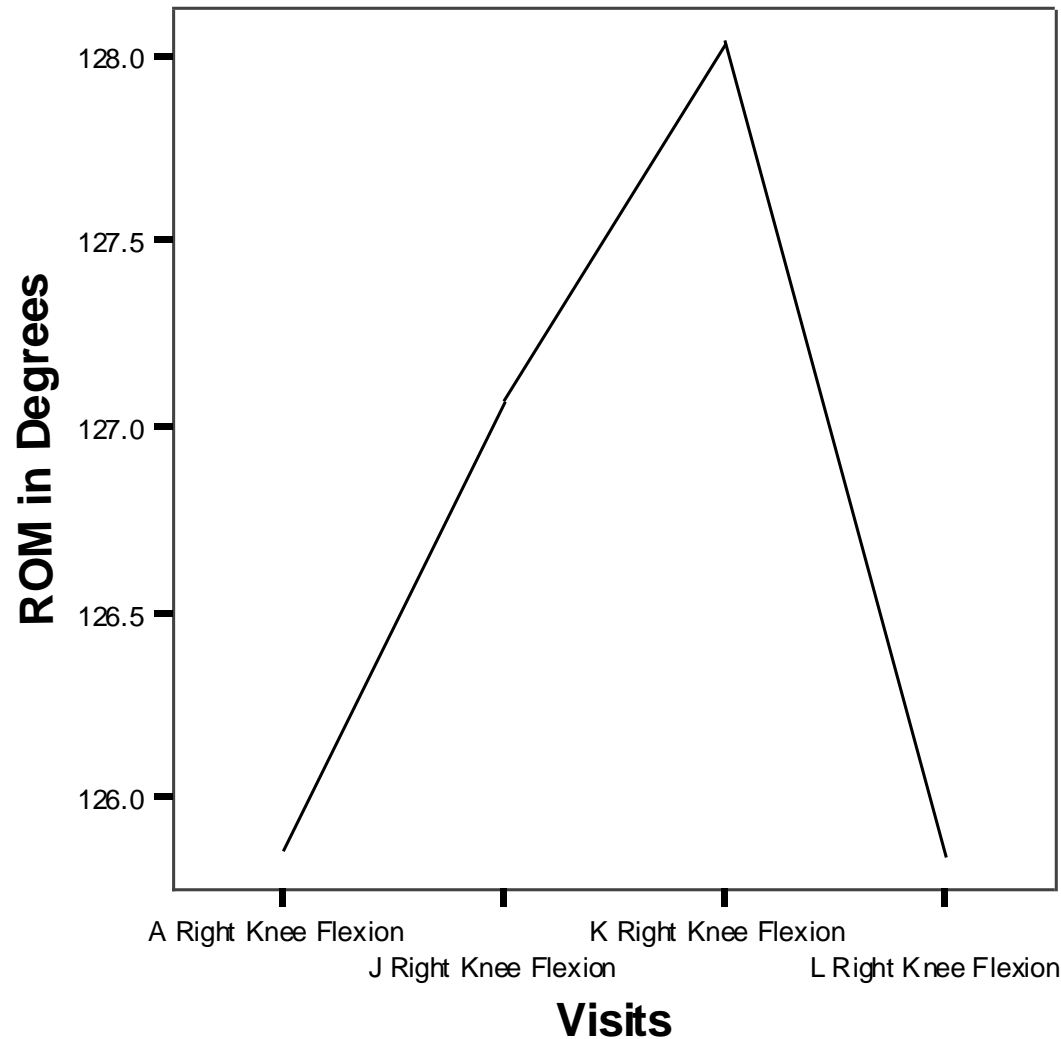
Right Knee Extension ROM



Right Knee Extension ROM in degrees

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	2.22 (2.82)	3.85 (4.21)	5.322	0.03	27
Socks+MLD	3.96 (4.31)	2.64 (3.21)	6.17	0.02	25
Withheld rx	2.64 (3.21)	6.08 (6.30)	17.832	0	25

Right Knee Flexion ROM



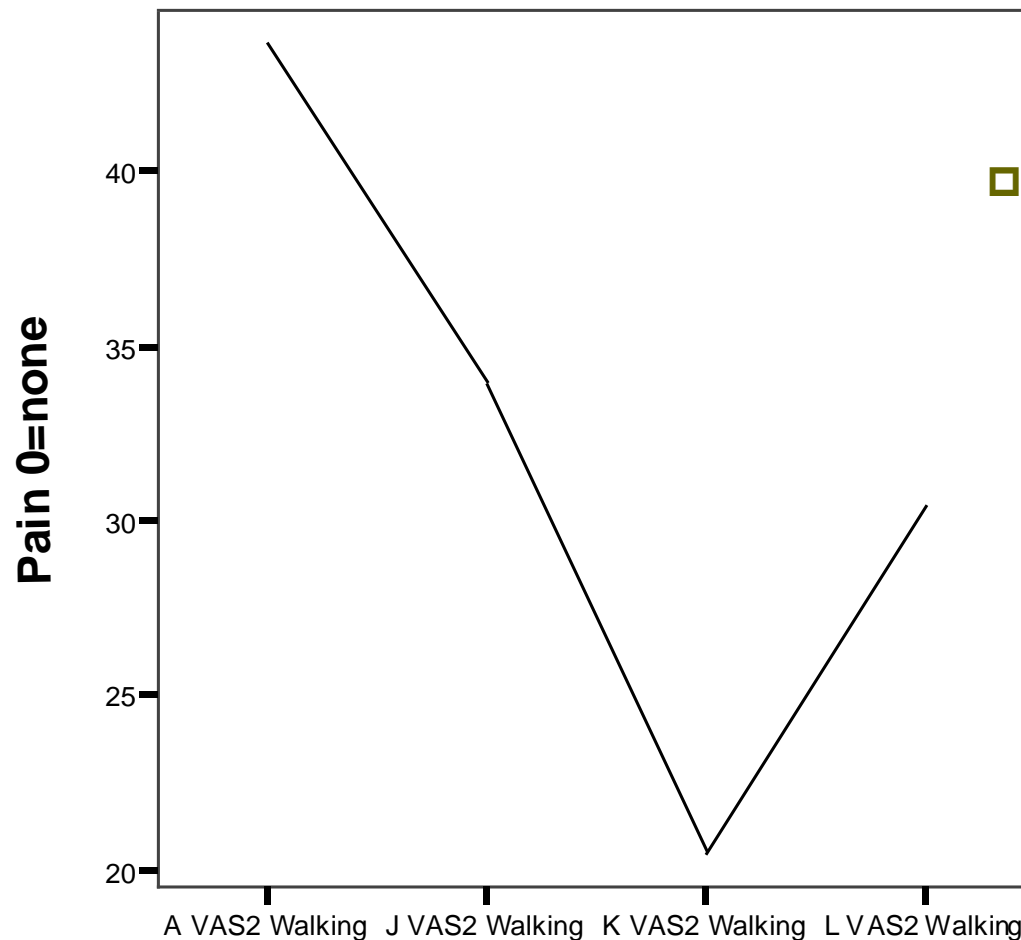
Dot/Lines show Means

*****Higher # better**

Right Knee Flexion ROM in degrees

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	126.59 (8.12)	127.07 (8.91)	0.22	0.64	27
Socks+MLD	126.52 (9.04)	128.04 (8.33)	2.999	0.1	25
Withheld rx	128.04 (8.33)	125.84 (8.74)	7.118	0.01	25

VAS in Walking



Visits

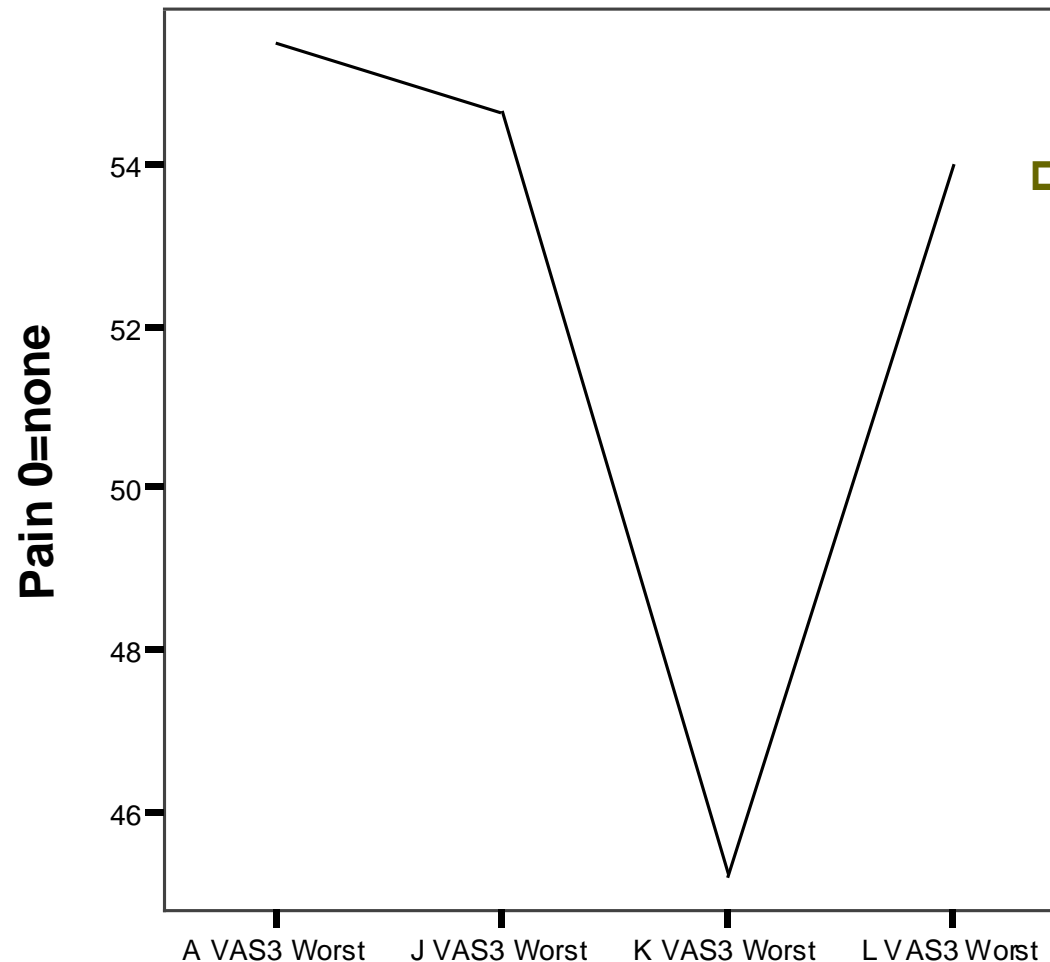
*****Lower # better**

VAS in Walking 0=none

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	42.00 (25.75)	33.93 (22.77)	3.732	0.06	27
Socks+MLD	34.54 (24.00)	20.46 (20.57)	12.556	0	24
Withheld rx	20.46 (20.57)	30.96 (26.24)	5.703	0.03	24

- VAS=visual analog scale 0-10/10 with 10 being worst pain imaginable

VAS at Worst



Visits

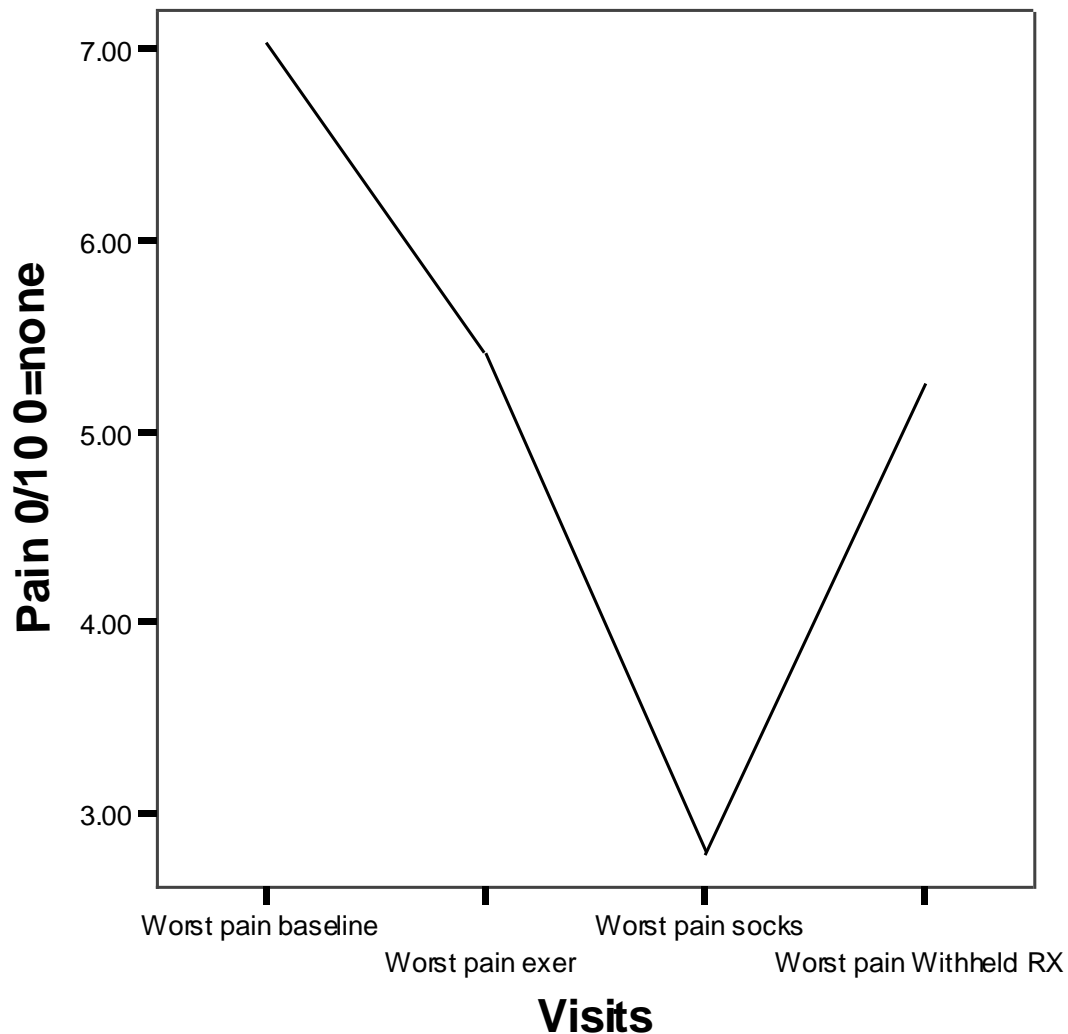
***Lower # better

VAS at Worst 0=none

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	54.04 (24.66)	54.67 (23.92)	0.014	0.91	27
Socks+MLD	55.08 (23.95)	45.21 (20.39)	6.51 6	0.02	24
Withheld rx	45.21 (20.39)	53.88 (22.90)	5.64 8	0.03	24

- VAS=visual analog scale 0-10/10 with 10 being worst pain imaginable

Worst Pain during Function



*****Lower # better**

Worst Pain during Function 0-10/10

	Mean (SD)		F	p	N
	Before	After		<0.05=sig	
Exercise	7.05 (2.09)	5.40 (2.58)	16.776	0	21
Socks+MLD	5.43 (2.64)	2.86 (1.97)	18.267	0	20
Withheld rx	2.79 (2.08)	5.20 (2.73)	37.273	0	23

Photos



▣ Signs of Venous insufficiency

Teleangiectasias or spider veins



Corona

Phlebectacia or malleolar flare





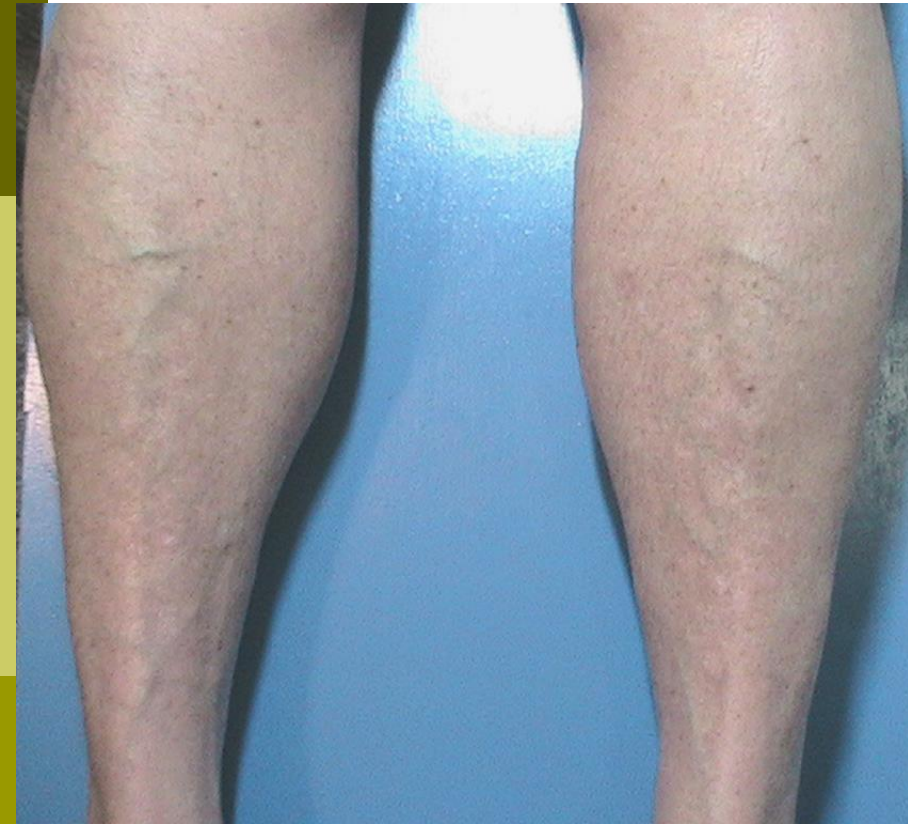
Sock lines
indicating
edema at
bilateral
ankles

Decreased
hair
pattern
lower ankle



Venous Stasis Ulcerations

Varicose Veins



Thickened and Congested Skin





Hemosiderin
staining

Increased
joint line
depth



Shiny, waxy
skin

Increased
depth of joint
lines



Edema

Hemosiderin
Staining

Sock
indentations

Decreased hair
growth in ankle
area

Edema of different sizes



Mild Edema



Moderate
Edema



Moderate
to severe
edema

Severe edema



Subject Response

- ❑ 3 measurement visits to establish baseline girth/ROM and again after each 2-week phase of study
 - Girth within .5 cm/ROM within 5 degrees
- ❑ 2 Weeks exercise/stretch BID 10 reps:
 - Glut max/glut med/quad closed chain; Mini Squats
 - Hamstring/gastroc belt stretch x 30 seconds
- ❑ 2 Weeks self MLD massage QID + Daytime use of 20-30mmHg OTC knee-high compression stockings
- ❑ 2 Weeks Withholding all treatment

Subject #18 42-year-old male

Subjective Chief Complaint: Standing up from sitting

Evaluation 6/10

After exer 5/10



2-9-07

Evaluation

LLE Girth Changes:

L knee flexion 122 degrees



3-27-07

After Exercise

+.5cm L ankle; -1cm L calf

L knee flexion 131 deg

Subject #18 42-year-old male

Subjective Chief Complaint: Standing up from sitting on evaluation 6/10

After exercise 5/10

After socks +MLD 3/10

After No RX 9/10



3-27-07

After Exercise

LLE Girth Changes:

L knee flexion 131 deg



4-11-07

After Socks & MLD

-2cm L ankle & Calf

134 deg



4-26-07

After RX Withheld

A +3.5cm/ C+1cm

100 deg

- Patient reports that during last phase of study to withhold all treatments his wife had to beg him to not use the socks which would ruin the study
- He noted such good improvements with the socks and massage that he wanted to resume using them
- He noted prior to study treatments he had significant pain with basketball and exercise, but during socks and MLD he was able to take strenuous hike without difficulty
- After socks and MLD he reported 80% improvement in left knee pain
- After withholding treatment for 2 weeks he reported the socks and MLD treatment improved knee pain by 90%

72-year-old female back pain worsened so greatly while undergoing measurement phase of study that she had injections for back pain that resolved knee pain. Continued measurement phase of study for 12 visits until knee pain returned to same levels at baseline on evaluation.



Evaluation

Girth LLE: A 24cm/C 44 cm



After Exercise

A 24cm/C 44 cm

72-year-old female chief complaint: Walking through Costco
on Evaluation 9/10

After Exercise 8/10

After socks+MLD 2/10

After Rx withheld 6/10



After Exercise
Girth: Calf 44 cm

After socks + MLD
42 cm

After RX Withheld
43 cm

-
- ❑ Patient noted subjectively that after the socks and MLD section she wanted to put the socks back on due to increasing knee pain within 3 hours
 - ❑ She felt socks and MLD improved her left knee pain by 70%

80-year-old female with right knee pain. Chief complaint Walking through Costco



Evaluation

Girth RLE: A 19.5 cm/C 34.5 cm



After Exercise

A 19 cm / calf 35 cm

80-year-old female with right knee pain. Chief complaint Walking through Costco on Evaluation 9/10

After Exercise 9/10

After socks+MLD 3/10

After No RX 8/10



After Exercise

Girth R ankle 19 calf 35 cm

After socks+MLD

ankle 18/calf 33 cm

After No RX

ankle 19/calf 36 cm

-
- Patient reported 75% reduction in right knee pain after socks and MLD for 2 weeks

71-year-old female with right knee pain chief complaint walking through Costco



Evaluation

Girth RLE: A 20cm/C 39cm



After Exercise

A 20.5cm/C 39cm

71-year-old female with right knee pain chief complaint walking through Costco on Evaluation 8/10

After Exercise 8/10 After socks+MLD 2/10

After No RX 4/10



After Exercise
Girth RLE: A20.5cm/C39cm
R knee flexion 104



After Socks+MLD
A 19.5cm/C37.5cm
116



After No RX
A20.5cm/C38.5 cm
106

-
- Patient reports 100% reduction in right knee pain after socks and MLD

Ideas to improve

- ❑ Subjects with severe edema require more compression so the 20-30mmHg socks would be inadequate-they should have jumped right into bandages and full treatment protocol-exclude them from the study
- ❑ Continue checking every 2 weeks after study to see when symptoms return-some took a little longer than the 2 weeks but all eventually had symptoms recur
- ❑ X-ray, MRI, and full orthopedic evaluation by a surgeon to determine if the subject is a candidate for TKR
- ❑ Girth measurements of the knee at midpatella
- ❑ Ankle AROM
- ❑ Functional test such as 6-minute walk test or a get-up and go

Special Thanks

BSN-Jobst Medical for
supplying compression
stockings