

# The Effects of Compression Band Treatment on Muscle Recovery After Eccentric Fatiguing Exercise

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## ABSTRACT

**Background:** Exercise induced muscle soreness causes an increase in pain and a decrease in performance, and multiple studies have examined the effectiveness of various means to reduce or eliminate delayed onset muscle soreness. Compression garments (CG) have been shown to reduce muscle swelling and soreness. The purpose of this investigation is to explore the effectiveness of a new type of CG known as Voodoo Floss on quadriceps strength and perceived soreness. **Methods:** Fourteen active college-aged students participated in the study. All subjects completed baseline isokinetic peak torque and total work measurements. Each participant completed exercise fatiguing protocol during two different sessions and were randomly assigned to use compression immediately following exercise during one of those sessions. Perceived pain and isokinetic testing was assessed two days following. **Results:** Statistical analyses indicated that the use of compression band treatment improved recovery in relation to peak torque,  $F(2,26) = 23.26$ ,  $MSE = 42.71$ ,  $p < .001$ . There were no significant differences in total work or perceived pain across all conditions ( $p = .17$ ,  $p = .75$  respectively). **Conclusion:** An acute compression band treatment following eccentric fatiguing exercise can elicit an improved recovery in active individuals looking to decrease effects of DOMS.

## INTRODUCTION

Delayed onset muscle soreness (DOMS) and reductions in strength are common phenomena that occur after eccentric fatiguing exercise and can result in a decrease in performance. Of those effects, DOMS is the most predominantly recognized. It can be characterized by pain, tenderness and stiffness to a damaged muscle upon pressure or movement and is most prevalent 24 to 72 hours following strenuous exercise<sup>1</sup>. Up to this point, conventional recovery methods involve resting the damaged muscle as to avoid additional inflammation and utilizing cryotherapy in an effort to promote healing of the muscle. However, because of the small magnitude of the damage that is incurred by eccentric exercise, the effects of icing might not be as effective as previously thought. In recent years, compression garments (CG) have risen in popularity as concurrent-exercise and post-exercise recovery implements<sup>2</sup>. It's theorized that compression alleviates the physiological strains associated with the after-effects of exercise by reducing swelling, muscle soreness and pain sensation, while promoting cellular repair and the clearance of myocellular proteins<sup>3</sup>. Although the use of compression garments is showing promising effects, there is no conclusive evidence on which type and method is most effective.

## SIGNIFICANCE OF STUDY

The significance of this study is to examine an acute response to a previously un-researched type of compression device. Voodoo Floss Bands are a cost effective, easy-to-use tool that can be utilized by active individuals wanting to reduce the effects of DOMS.

## PURPOSE AND HYPOTHESIS

The purpose of this study is to determine whether eccentrically-induced delayed onset muscle soreness and associated strength reduction can be offset by the combined use of compression bands and active recovery in active college-aged students. We hypothesize that the combined use of compression bands and active recovery will demonstrate less of a reduction in isokinetic muscle strength and lower levels of perceived pain as compared to the use of active recovery alone.

## METHODS

### Subjects

14 college-aged individuals were recruited through flyers and word of mouth within the University of Wisconsin- Eau Claire. Informed consent and IPAQ will be obtained from all participants.

### Instrumentation

- HUMAC NORM Isokinetic Extremity System
  - Computer Sports Medicine Inc., Stoughton, MA
- Leg Extension<sup>G3-S71</sup>
  - Matrix Fitness, Cottage Grove, WI
- Voodoo Floss Bands
  - ROGUE FITNESS, Columbus, OH

### Testing Procedures

#### ➤ WEEK 1: Introduction and Baseline Testing

- Day 1:
- Cover Letter and Informed Consent
  - IPAQ
  - Height and weight measurements
  - Baseline isokinetic strength test (Figure 3)
  - Leg extension concentric 1-RM test (Figure 1)

#### ➤ WEEK 2 and 3: Testing

- Day 1:
- Warm-up (5 min cycling)
  - Eccentric fatiguing exercise (Figure 1)
    - Eccentric Leg Extension 7x10 @ 85% Concentric 1-RM (60 sec rest)
  - Active recovery (Figure 2)
    - Subjects randomized into one of two compression groups\*
      - 5 min after exercise
      - Accumulate 3 minutes total with band and squatting
- Day 2 (48 hours later):
- Gauge DOMS pain rating using VAS by doing bodyweight squat
  - Isokinetic strength testing

\*Group 1: Compression week 2, non-compression week 3  
Group 2: Non-compression week 2, compression week 3

Fig. 1-3 Eccentric Leg Extension, Active Recovery with Compression, Isokinetic Strength Test



Fig. 1



Fig. 2



Fig. 3

## STATISTICAL ANALYSIS

- Data analyzed using IBM SPSS version 19.0
- Paired samples t-test to determine individual differences with and without compression
- Alpha level set at .05 to determine statistical significance

## RESULTS

- Peak torque significantly decreased from baseline to compression ( $p = .001$ ) and baseline to non-compression ( $p < .001$ ). (Fig. 4 and Table 1)
- Compression peak torque was significantly higher than non-compression peak torque ( $p = .014$ ). (Fig. 4 and Table 1)
- There was no significant difference in total work between any of the conditions. (Table 1)
- There was no significant difference in perceived pain between compression and non-compression treatment. (Table 1)

Fig. 4

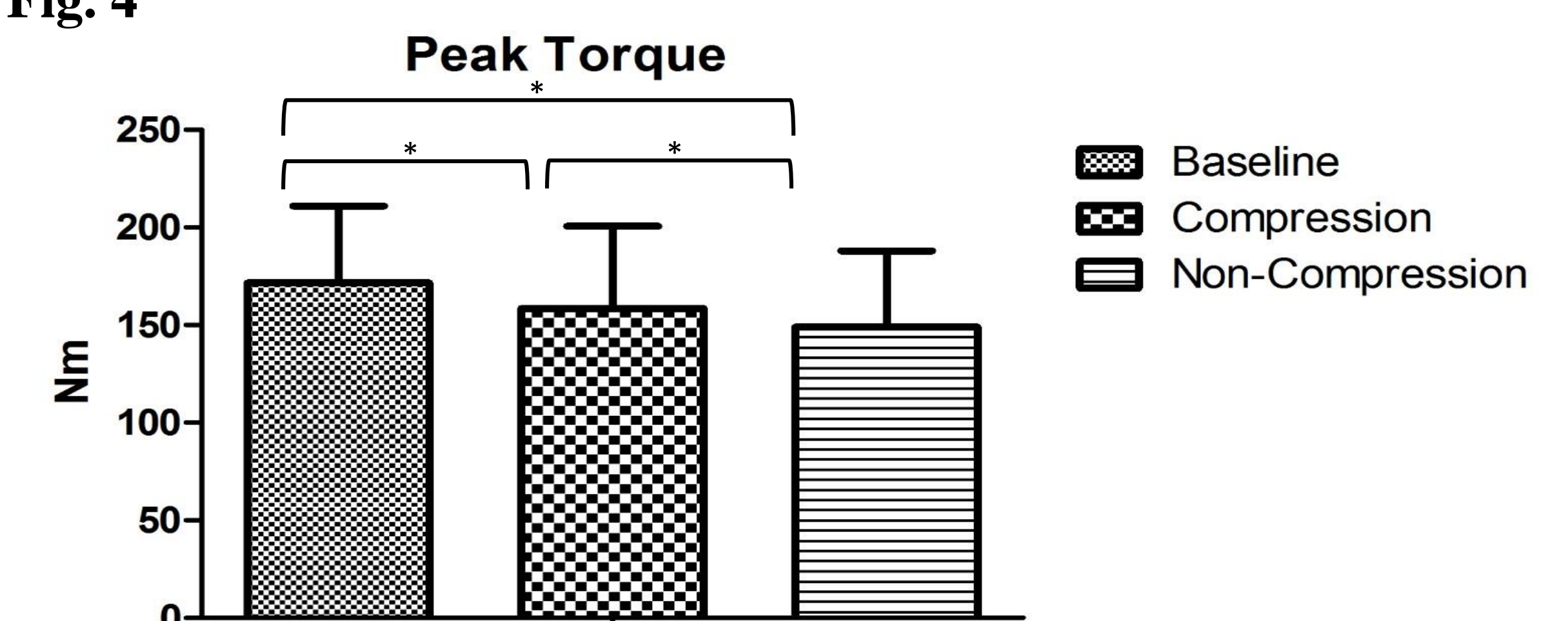


Table 1: Pairwise T-test

Comparisons	Mean ± SD	95% CI		t	p	
		Lower	Upper			
PT (Nm)	Baseline vs. Comp	13.06 ± 11.06	6.69	19.46	4.42	.001
	Baseline vs. Non-Comp	22.76 ± 13.58	14.92	30.60	6.27	.000
	Comp vs. Non-Comp	9.68 ± 12.82	2.28	17.08	2.83	.014
TW (Nm)	Baseline vs. Comp	-5.23 ± 245.33	-146.88	136.42	-0.08	.938
	Baseline vs. Non-Comp	122.31 ± 332.33	-69.56	314.19	1.38	.192
	Comp vs. Non-Comp	127.54 ± 240.50	-11.32	266.41	1.98	.069
PP (VAS)	Comp vs. Non-Comp	-.24 ± 2.83	-1.88	1.39	-.32	.754

Note. SD = standard deviation; PT = peak torque; TW = total work; PP = perceived pain; VAS = visual analogue scale (range: 1-10)

## SUMMARY AND CONCLUSION

- This study provides data that suggests that recovery of peak torque following fatiguing exercise can be improved with the use of compression, which is in agreement with previous research<sup>1</sup>.
- Although not significant, recovery of isokinetic total work was greater with the use of compression compared to non-compression.
- It appears that the use of Voodoo Floss compression band following fatiguing exercise can be a practical and effective means of improving muscle recovery.
- Future research should examine the ideal timing of application, duration of session, and repeated use effect of the Voodoo Floss for recovery.

## KEY REFERENCES

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- <sup>3</sup>MacRae, B. A., Cotter, J. D., & Laing, R. M. (2011). Compression garments and exercise garment considerations, physiology and performance. *Sports Medicine*, 41, 815-843.

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