BIOMECHANICS
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Foam rolling as a short term recovery intervention during a submaximal quadricep fatigue protocol

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Introduction

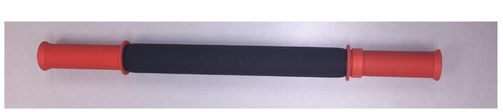
Performance maintenance and recovery is a large and growing industry. Fads are plentiful and phase in and out of existence. Foam rolling and roller massagers are such fads. It is purported that these techniques maintain performance and aid in recovery [1]. It has been shown that foam rolling increases hip range of motion and reduces delayed onset muscle soreness (DOMS), although the exact mechanism for these effects is still unknown [1,2]. Foam rolling has claimed to have similar benefits to massage. Massage like compression is often used on the field for athletes in between bouts of activity in an attempt to gain a competitive advantage [3]. The efficacy and effects of both are still misunderstood and should be further explored.

Purpose

The purpose of this study was to observe the biomechanical effects of roller massage between bouts of submaximal fatigue on the quadriceps muscle.

Methods

A pilot study was performed to understand the performance response to roller massager as an acute recovery intervention. Participant's were free of lower limb injuries, congenital musculoskeletal abnormalities, and did not have any surgeries in the 6 months prior to data collection. Participant's parametrics are presented in Table 1.



Methods

	Gender	Age	Dominant Leg	Weight (kg)	Height (cm)
P1	Male	28	Right	73.2	165.0
P2	Female	23	Right	54.5	158.1
P3	Male	32	Left	75.5	165.0

Table 1: Participant Anthropometrics

Previous to data collection, participants were familiarized with the Biodex machine and isokinetic protocol; also, anthropometric measurements (i.e., height, weight) were taken and biodex adjustments were recorded.

During the testing sessions, data was collected on both the dominant and non-dominant legs. The participant performed a fatigue protocol of 10 repetitions of an isokinetic leg extension exercise at 45 deg/s, then had a 2.5-minute passive rest (PR) or a roller massage (RM) recovery applied while lying supine on a padded exam table (Figure 1). Following the intervention, the participant moved back to the Biodex to repeat the fatigue protocol on the same leg. The participant was given a 5-minute rest then execute the same process on the opposite leg. Testing days were performed 48 hours apart. The participant was instructed not to perform heavy lower body exercises within 24 hours of either testing day.

Figure 1: Experimental set-up

Results

For the dominant leg, increases in post-intervention torque of 0.56% for the PR and 1% for the RM intervention were found. For the non-dominant leg, it was found that the RM allowed a post-intervention increase of 5.4% of the torque, while the PR had a decrease in torque of 0.74% (Figure 2).

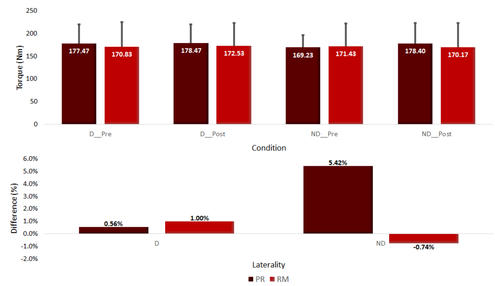


Figure 2: Average peak torque comparison. D= dominant leg; ND= non-dominant leg; Pre= pre-intervention; Post= post-intervention

Analyzing the overall work through the ten reps, both interventions showed decreased work (5.08% for PR and 0.73% for the RM) in the dominant leg. Contrary to the dominant leg, in the non-dominant leg both interventions allowed for the production of more work in the post-intervention; even more, the RM allowed for the generation of more work than the PR intervention (7.86% and 1.16% respectively [Figure 3]).

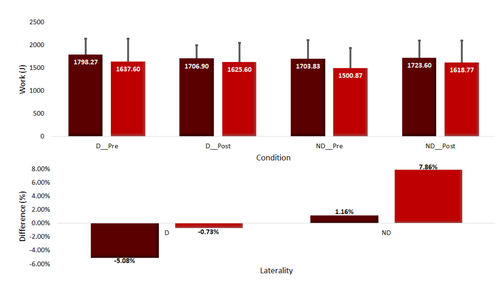


Figure 3: Average total work comparison. D= dominant leg; ND= non-dominant leg; Pre= pre-intervention; Post= post-intervention

Discussion

Differences were seen in pre and post interventions between PR and RM on torque and total work. It seems that limb dominance has an effect on the results obtained, as we see opposite effects in RM peak torque. On the dominant leg, an increased torque was obtained in both treatments; nevertheless, on the non-dominant leg only the PR increased the torque. With regards to the total work, on the dominant leg both interventions allowed recovery of the peak force, but on the non-dominant leg the work actually increased. These differences were more obvious in the RM than in the PR. Therefore, from the results obtained from this pilot study, we can hypothesize that if the intention is to produce an explosive maximal torque, the RM did not show much difference from the PR on the dominant leg, and resulted in a less torque on the non-dominant leg. On the other side, if the intention is total work (performance), the RM showed promising results on both legs.

No recommendations can be made from the results of this study. Passive rest seems to be the better option for recovery in acute bouts for explosive exercise, while RM seems to have promising effects in overall maintenance of performance.

Conclusion

More data is needed to accurately describe differences in torque and work, as well as to explore discrepancies between the dominant and non-dominant legs.

References

1.Best, TM, et al. *Clin J Sport Med* **18,** 446-460, 2008.
2.MacDonald, GZ, et al. *J Strength Cond Res* **27(3),** 812-821, 2013.
3.Moraska A. *J Sports Med Phys Fitness* **45(3),** 370-380, 2005