Acute effects of foam rolling on vertical jump height and soft tissue properties

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Introduction

Self-myofascial release using a foam roller became increasingly attractive to enhance the athletes performance or recovery as well as to treat fascial disorders [1,2]. However, most of the existing studies showed no performance enhancing effects concerning maximum strength and power, anaerobic capacity, explosive strength, and anaerobic power related parameters [1,3]. Moreover, foam rolling (FR) is used in therapeutic settings, i.e. physiotherapy, to treat soft tissue disorders caused by overuse, trauma, and muscle imbalances [4]. It is believed that FR have similar effects as a massage, which include relieved muscle tension, increased flexibility, and improved range of motion [2]. However, the exact physiological mechanism of FR and the effect on biomechanical soft tissue properties are unknown, yet [3]. The aim of this study was to assess the acute effects of FR on vertical jump height and soft tissue properties.

Methods

20 males participated for this study (26.6±2.7 yrs; 181.6±6.8 cm; 80.4±9.1 kg).

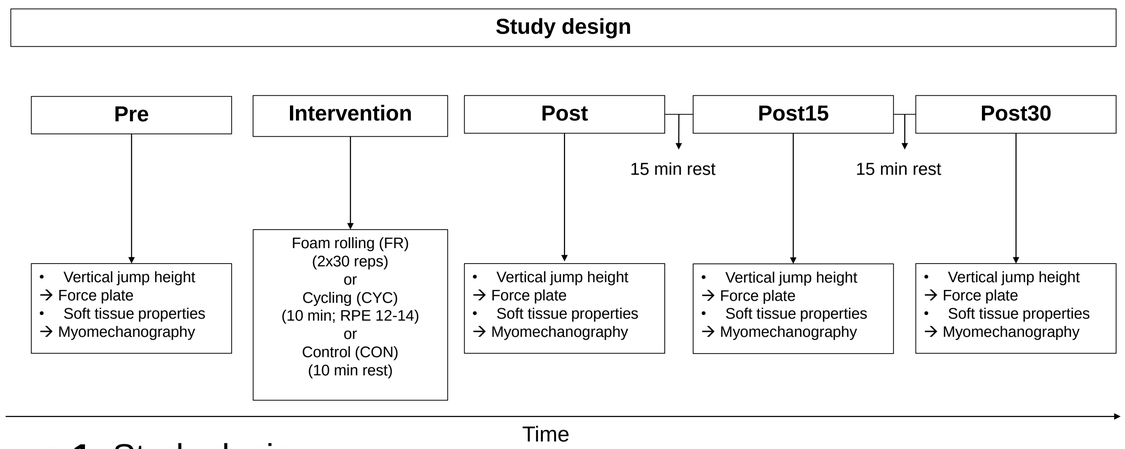

Figure 1: Study design.

FR was performed with a conventional high density foam roller (BLACKROLL®, Bottighofen, CH) along the anterior thighs and calves. CYC consists of a 10 min stationary cycling ergometry (Cyclus2 RBM, Leipzig, GER) and during CON, participants rested in supine position for 10 min. Three counter movement jumps were performed without arm swing. Mean vertical jump height was calculated with the impulse-momentum method using a force plate (Kistler 9287BA, Winterthur, CH). The passive muscle tone [Hz] and soft tissue stiffness [N/m] were measured in supine position using a myomechanography device (Myoton AS, Tallinn, ES). The myomechanography was performed on the m. rectus femoris of both legs using the recommendations for electromyography sensor positioning (Figure 2).

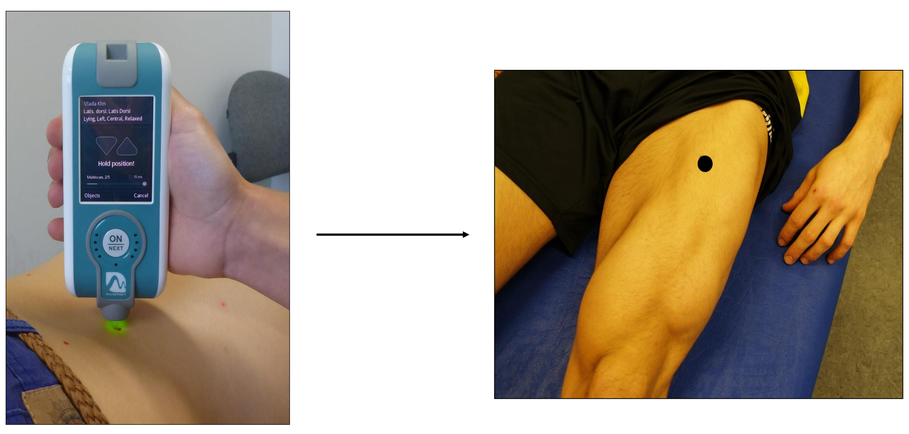

Figure 2: Myomechanography on the anterior thighs.

Results

A significant main effect was observed for the jump height ($p<.001$), muscle tone (right: $p=.030$; left: $p=.008$), and stiffness (right: $p<.001$; left $p=.002$).

Thereby, the jump height significantly increased only after CYC (34.8±3.0 vs. 36.4±3.0 cm; $p=.001$) and decreased thereafter, as in FR and CON. There was a non-significant decrease in muscle tone after FR (left: $p=.430$; right: $p=.210$), which returned to pre-values afterwards. A significant increase in muscle tone was only found at the left side after CYC ($p=.010$). The stiffness significantly decreased after FR (left: $p=.010$; right: $p=.004$) and also returned to pre-values afterwards. However, the increase in stiffness after CYC was not significant (left: $p=.170$; right: $p=.120$).

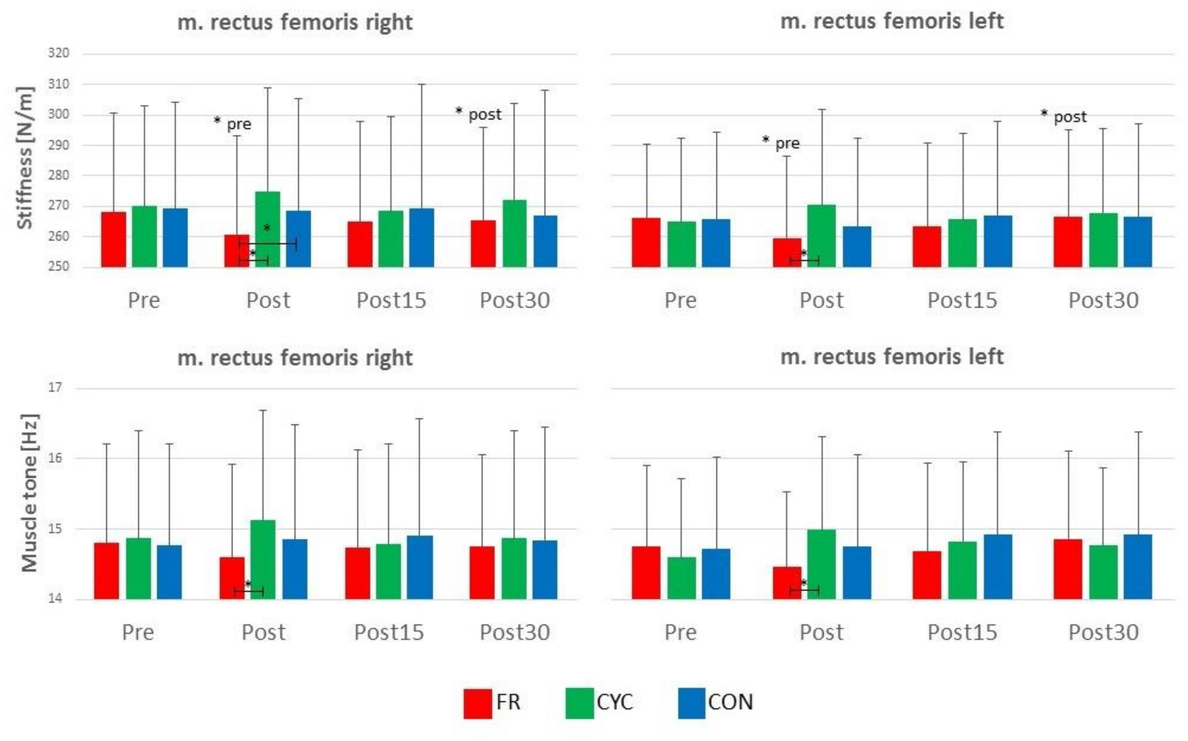

Figure 3: Soft tissue properties of the m. rectus femoris (left & right) before as well as 0, 15 and 30 minutes after each intervention (* $p<.05$; † $p<.001$).

Discussion

The results do not show acute performance effects on vertical jump height after FR compared to a warm-up routine on a cycling ergometer and are in line with previous studies [1,2]. The decrease in muscle tone and soft tissue stiffness after FR may be explainable by alterations of the central nervous and/or peripheral system [5]. Overall, the isolated application of FR as a warm-up routine before explosive activities is questionable. Since an acute effect of FR appears in a decreased muscle tone and stiffness, more research is required to show if the decrease is caused by fascial, muscular, and/or other soft tissues and whether the use as warm-up routine is meaningful.

References

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