

1 Warm up effects on strength training

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5 **Different intensities of warm up: effects on strength training**

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14 Acknowledgments: This project was supported by the National Funds through FCT –  
15 Portuguese Foundation for Science and Technology (UID/DTP/04045/2013) – the European  
16 Fund for Regional Development (FEDER) allocated by European Union through the  
17 COMPETE 2020 Programme (POCI-01-0145-FEDER-006969) – competitiveness and  
18 internationalization (POCI).

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## Different intensities of warm up: effects on strength training

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INTRODUCTION: Warm-up is considered an essential part of the exercise and training performance, preventing from injuries and optimizing physical activity performances (Fradkin, Zazryn & Smolig, 2010). Not much is known about the effects of preparation activities on muscle performance, and, more specifically, on strength training performance (McGowan, Pyne, Thompson & Rattray, 2015). The current study aimed to verify the effect of two different intensities of specific warm-up in a full-squat training set.

METHODS: The full-squat exercise was evaluated regarding the mechanical responses, such as the mean propulsive velocity (MPV), mechanical power (MP) and velocity loss (VL). The physiological and psychophysiological responses (heart rate, tympanic temperature, blood lactate concentration and subjective perception of effort) were also recorded. Fourteen male subjects, aged between 19 and 35 years old (mean  $\pm$  SD: 24.43  $\pm$  3.98 years-old, 77.71  $\pm$  10.35 kg of body mass, 1.75  $\pm$  0.07 m of height), performed a low-intensity (6 repetitions of 40% of training load) and a high-intensity warm-up (6 repetitions of 80% of training load). Then, after 5min of passive rest, they performed a training set comprising 3x6 repetitions of 80% of 1 repetition maximum (1RM) with 3min of rest.

RESULTS: Differences were found in MPV during the 2<sup>nd</sup> set (0.61  $\pm$  0.09 vs. 0.66  $\pm$  0.05 m.s<sup>-1</sup>; p = 0.01, d = 0.79) and in the 3<sup>rd</sup> set (0.60  $\pm$  0.08 vs. 0.64  $\pm$  0.07 m.s<sup>-1</sup>; p = 0.04, d = 0.59) with higher values for the high-intensity warm-up. Also, higher MP values were found during the 2<sup>nd</sup> (2696  $\pm$  577 vs. 2938  $\pm$  554 W; p = 0.03, d = 0.67) and the 3<sup>rd</sup> training sets (2683  $\pm$  577 vs. 2880  $\pm$  598 W; p = 0.04, d = 0.61) when high-intensity warm-up was used. Moreover, the maximal MP values were obtained in warm-up with higher intensities (p = 0.01, d = 0.58, respectively). These results could be caused by the increased tympanic temperature (35.94  $\pm$  0.45 vs. 36.47  $\pm$  0.54 °C; p = 0.04, d = 0.62) and lactate values (1.96  $\pm$

48 0.70 vs.  $2.59 \pm 0.56$  mmol.l<sup>-1</sup>;  $p = 0.01$ ,  $d = 0.88$ ) recorded after the high-intensity warm-up  
49 procedure.

50 CONCLUSIONS: The results showed that specific warm-up with 80% of training load  
51 resulted in better performance in a full-squat training set. It seems that higher intensities of  
52 warm-up may be more effective for strength training optimization.

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