Title: The relationship between muscle strength and size, physical activity levels and function in hip osteoarthritis: a cross sectional study

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Question: Is there a relationship between lower limb muscle strength and size, physical activity levels and function in hip osteoarthritis (OA)? Design: A cross-sectional study. Participants: Sixteen healthy controls and 21 individuals with hip OA over 45 years old. Intervention: Participants underwent lower limb muscle strength testing using an isokinetic dynamometer, measurement of thigh muscle cross-sectional area (CSA) and density using peripheral quantitative computed tomography scan, a timed stair test and monitored physical activity levels. Outcome measures: Isometric maximal voluntary contraction of lower limb muscle strength, thigh muscle cross-sectional area (mm²) and density (g.cm⁻³), time to ascend and descend 13 steps and intensity of one week physical activity levels. Results: Thigh muscle density was less for hip OA than controls. There was a significant difference for the Timed Stair Test between hip OA and controls (Hip OA= 10.7 ± 1.7, Controls = 14.4 ± 4.5 seconds, p = 0.0040), a positive relationship between hip adductor strength for light (r = .404, p < .05) and moderate (r = .402, p < .05) physical activity levels and a negative correlation between hip muscle strength and time to complete the Stair Test (r < -.540, p < .014) in the hip OA group. Conclusion: Participants with hip OA have lower thigh muscle density and greater concentration of intra-muscular fat than controls. Weaker hip muscles were associated with reduced functional stair task and lower physical activity levels in hip OA.

Key Practice Points:
• Lower limb muscle weakness and in particular hip adductor weakness is related to lower physical activity levels
• Hip muscle weakness is related to less function as measured using a timed stair test.
• Further research is required to identify the extent of the relationships between muscle strength and size and how this may impact on hip OA function and management.