

Assessing the Muscle Size and Size Asymmetry of the Gluteus Maximus and the Hamstring

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ABSTRACT

Injury, adverse circumstances, or habitual movement patterns can cause imbalance throughout the body's muscular system, which can impact performance and injury risk in sports such as football. **PURPOSE:** This study aims to investigate the relationship between 1) overall gluteus maximus (GM) and hamstring (HS) muscle volume and 2) observed asymmetry between GM and HS muscles in the BYU subset of collegiate football players from the HAMIR research study, and any players within the subset with clinically important asymmetry. **METHODS:** The study utilized Magnetic Resonance Imaging (MRI) to determine the raw volume of the GM muscle and HS muscles (combined volume of the long and short heads of the biceps femoris, semimembranosus, and semitendinosus muscles) of 77 Division 1 football players (age: 23.1 ± 1.91 years, height 73.91 ± 2.36 in., weight: 229.8 ± 44.75 lbs.), and 16 of the 77 players with observed muscle asymmetry. MR images were taken preseason with a Siemens 3T TIM-TRIO system. Post-processing segmentation provided a volume estimate of each muscle of interest. The volume of individual HS muscles was summed and used in the data analysis. A percent asymmetry was calculated from these measurements. A Pearson's-product correlation was determined between GM and HS muscle volumes and muscle size asymmetry. **RESULTS:** There is a moderate to strong correlation (R-values ranged from .70 to .65) between the raw muscle sizes of the GM and HS. However, there was no correlation between the percent asymmetry of the GM and HS muscles (R-values ranged from .15 to .01) when analyzing all players. When considering the subset of players with clinically important asymmetry, there was a negligible to weak correlation (R-values ranged from .24 to -.01). **CONCLUSION:** While GM and HS sizes are generally correlated, observed asymmetry in the HS muscles has weak to no relationship with observed asymmetry in the GM. Although the HS and GM are a functional muscle group (hip extension), GM asymmetry is not indicative of the presence of an HS asymmetry. Healthcare professionals and coaches can use this information as they create plans for a return to play to focus specifically on the rehabilitation of an asymmetric muscle group.