

**COMPARISON OF GOLFERS AND NON-GOLFERS WEIGHT-BEARING HIP ROTATION JOINT RANGE OF MOTION**

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**INTRODUCTION**

Participation in sports places specific demands on the musculoskeletal system that, over time, may cause adaptations in soft-tissue. Athletes who participate in sports requiring repetitive rotational movement on one side and not the other (such as overhead sports) have experienced differences in their side-to-side joint range of motion<sup>1</sup>. Range of motion (ROM) asymmetry such as this has been linked to injury. Although this phenomenon has been documented for the upper extremities, little is known about similar adaptation in the lower extremity structures such as the hip. Athletes who participate in sports experience rotational movement in a functional capacity (weight-bearing status). Although there are established norms for passive and active hip rotation ROM, these measures have typically been made in a non-weight-bearing status. The purpose of the study was to examine anatomical limits of hip rotation ROM (weight-bearing conditions) in elite female golfers and age-matched non-golfing controls to determine if asymmetry between the hips exists.

**METHODS**

Following a five minute bike warm-up, fifteen healthy, female collegiate golfers (mean age 19.6 ± 1.4 yrs; ht. 163.3 ± 6.5 cm; wt. 59.5 ± 6.6 kg) and twenty age-matched females (mean age 20.5 ± 1.7 yrs.; ht. 166.8 ± 7.7 cm; wt. 61.5 ± 10.2 kg) were evaluated for hip rotation ROM during weight-bearing. All subjects were right-hand dominant, and free from hip or back pain in the past six months. Data were acquired through 3-D videography (Motion Analysis Inc.) and a multi-segment bilateral marker set. Medial and lateral rotation for all subjects was measured on both the right and left side at a stance width equivalent to the distance between each subject's greater trochanters (Cond. A), as well as in a golf stance width (Cond B). For each condition, the mean of each subject's three trials was used for statistical analysis. A two-way ANOVA (group x measure) was run to test for the presence of a significant difference between the two groups (alpha level

set at 0.05), as well as separate paired t-tests (golfers and non-golfers) for examining side-to-side differences within groups.

**RESULTS AND DISCUSSION**

Non-golfers's right lateral ROM was significantly greater than the golfers (48.7° ± 10.3, 40.7±6.5; p = 0.02) in Cond A, whereas the remaining hip rotation ROM measurements did not significantly differ between the groups. In condition B, there were no significant differences between the golfer group and non-golfer group hip rotation ROM measurements. In addition, both groups (non-golfers and golfers) demonstrated symmetrical hip rotation ROM, as none of the measured directions were significantly different. Thus, a golfer's right medial rotation did not significantly differ from left medial rotation, and a non-golfers right medial rotation did not significantly differ from left medial rotation.

**CONCLUSIONS**

Except for a difference in right side lateral rotation during Cond A, the hip ROM of the golfer group was not significantly different from that of the age-matched, non-golfer group. Although the golfer group experiences repetitive unilateral rotations on the left (lead) hip, there does not appear to be an accommodation of joint range of motion, as evidence by the symmetrical range of motion among these subjects. However, previous unpublished data<sup>2</sup> has shown that there is a significant difference when measuring side-to-side hip joint range of motion in a non-weight-bearing status. Thus, there may be a true anatomical adaptation in the soft-tissue, but this does not appear in a dynamic (weight-bearing) measurement.

**REFERENCES**

1. Ellenbecker T, et al. *Med Sci Sports Exerc.* **34**(12), 2052-2056, 2002.
2. Gulgin H, *ACSM National Meeting*, Nashville, TN, Abstract submission, 2005.

**Table 1** WB Hip Rotation Rom Means and Standard Deviations Condition A (gr troch width)  
 ROM in degrees

Group	Rmed	Lmed	Rlat	Llat
Non-golfers	27.8±7.5	28.0±9.4	48.7±10.3*	42.3±11.2
Golfers	29.8±9.2	26.5±9.8	40.7±6.5	39.5±8.4

\* p = 0.02, significant at p < 0.05

**Table 2** WB Hip Rotation Rom Means and Standard Deviations Condition B (golf stance width)  
 ROM in degrees

Group	Rmed	Lmed	Rlat	Llat
Non-golfers	27.9±7.7	27.2±7.2	51.9±11.9	47.3±10.9
Golfers	29.9±9.6	27.2±10.2	48.8±6.6	48.2±9.4