

# TRUNK ROTATION STRENGTH AND ENDURANCE IN HEALTHY NORMALS AND ELITE MALE GOLFERS WITH AND WITHOUT LOW BACK PAIN

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## ABSTRACT

**Background.** The relative importance and asymmetric loading of the trunk muscles in golf (slow rotation backswing followed by high velocity downswing) may cause side-to-side imbalances in axial rotation strength and endurance characteristics amongst elite players who frequently play and practice. Such imbalances may further be compounded by the presence of low back pain.

**Objective.** To establish and compare trunk rotation strength and endurance of healthy individuals who do not play golf and those that are highly skilled at the sport. Additionally, a smaller group of elite golfers with non-debilitating low back pain (LBP) were also evaluated and compared to their healthy counterparts.

**Methods.** Forty healthy non-golfing control subjects, 32 healthy elite golfers, and 7 golfers with LBP participated in this study. Bilateral trunk rotation strength and endurance was assessed using the Biodex System III Isokinetic Dynamometer with torso rotation attachment. Strength and endurance data was analyzed using 2-way ANOVA.

**Results.** No significant differences in peak torque were found within or between groups. However, golfers with LBP demonstrated significantly less endurance in the non-dominant direction (the follow-through of the golf swing) than either healthy group. No significant difference in endurance was found between the non-golfing controls and the healthy elite golfers.

**Conclusions.** Trunk rotation endurance in golfers with LBP might be more important than strength alone in the prevention and treatment of LBP. The results from this study provide useful information on possible risk factors associated with low back pain in golfers (decreased endurance) and allow for sport-specific clinical intervention strategies to be developed.

**Key Words:** spinal rotation, injury, golf

## INTRODUCTION

The effective execution of the golf swing not only requires rapid movement of the extremities but also substantial strength and power of the trunk muscles. The torso rotates away from the target (to the right for a right handed player) at approximately 85 deg/sec on the backswing while the powerful downswing involves trunk velocities approaching 200 deg/sec.<sup>1</sup> Pink et al<sup>2</sup> demonstrated relatively high and constant activity in the abdominal oblique muscles throughout most parts of the golf swing of skilled amateur players. In a similar study using professional golfers, Watkins et al<sup>3</sup> measured muscle activity in the erector spinae, abdominal oblique, and rectus abdominis. These authors established that all trunk muscles were relatively active during the acceleration phase of the golf swing with the trail-side abdominal oblique muscles showing the highest level of activity.

Given the relative importance of the trunk muscles in golf, particularly in terms of generating powerful axial rotation on the downswing, repetitive play and practice might contribute to enhanced rotational strength and endurance amongst these athletes. Furthermore, this asymmetric pattern of trunk rotation during the golf swing (slow rotation

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