

LOW BACK PAIN IN GOLF: DOES THE CRUNCH FACTOR CONTRIBUTE TO LOW BACK INJURIES IN GOLFERS?

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INTRODUCTION: Nearly 41% of low back injuries in golf occur around impact or during the early follow-through (McHardy et al., 2007). In view of these recent statistics, it is important to consider the significance of the crunch factor as a possible contributor to golf-related low back injuries. The crunch factor was described by Sugaya et al. (1997) as the instantaneous product of lateral trunk flexion (LFA) and axial trunk rotational velocity (ARV) and was based on the knowledge that both of these measures reach their peak close to impact. The authors reported that these factors would contribute to spinal degeneration and stated that the crunch factor could be useful to compare trunk mechanics in injured and healthy golfers. However, as only one earlier study (Lindsay & Horton, 2002) has examined the crunch factor in injured golfers, this work further considered the importance of this measure in low back pain golfers.

METHODS: Fifteen healthy golfers (NLBP) and twelve golfers with a mild or greater level of low back pain (LBP) were recruited. Each golfer performed 20 drives, whilst being filmed by three genlocked video cameras (50 Hz). Three-dimensional kinematics were derived for the best three swings using Peak Motus. The crunch factor was calculated as the instantaneous product of LFA and ARV, where LFA was the angle between the segments joining the mid-hip and mid-shoulder markers and the right and left hip markers minus ninety degrees and ARV was the first derivative of the hip to mid-trunk differential angle with respect to time. An ANCOVA controlling for age was used to assess for inter-group differences.

RESULTS: The crunch factor for both groups increased rapidly from the mid-point of the downswing through impact and into the follow-through, but the statistical results showed no significant difference between the groups with respect to the peak value. Similarly, peak lateral flexion and axial trunk rotational velocity did not differ between the golfers (Table 1).

Table 1: Peak crunch factor, lateral flexion and axial trunk rotational velocities.

	LBP		NLBP		p	Cohen's d
	Mean	SD	Mean	SD		
Peak Crunch (deg²/s)	4879.7	2194.9	4920.2	2273.4	0.44	0.24
Peak Lateral Flexion (deg)	-19.1	5.6	-19.1	5.7	0.36	0.28
Peak Axial Trunk Rotational Velocity (deg/s)	-271.0	76.8	-260.4	50.3	0.36	0.33

DISCUSSION: This research showed no significant difference between the LBP and NLBP groups for peak LFA, ARV or the resulting crunch factor. These data were comparable to the peak crunch factors reported previously for six injured and uninjured golfers (Lindsay & Horton, 2002), but were greater than those presented for healthy golfers (Morgan et al., 1999). The non-significant findings together with small effect sizes suggest that the crunch factor is not a contributory factor in the development of low back pain in golfers.

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