Portuguese Journal of Sport Sciences
11 (Suppl. 2), 2011

THE EFFECTS OF WEARING SPANDEX GARMENT WITH COMPRESSION BAND ON KINEMATIC VARIABLES DURING A GOLF SWING

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The purpose of this study was to investigate how spandex garment with compressive band affects kinematic variables during a golf swing. The X-factor and angular velocity of the club in EG were increased during the down swing phase, whereas the significant changes of other kinematic variables were not found in this study. Thus, the effects of wearing spandex garment with compression band cannot be explained as a function of the kinematic variables of interest. It is clear that wearing spandex garment with compressive band may enhance joint stability, which in turn may affect joint kinetics and muscle activation. This has led to suggestions of the need for further kinetic and EMG analyses to evaluate its function.

KEY WORDS: golf swing, spandex garment with compressive band, kinematic, X-factor.

INTRODUCTION: The elasticity of garments provides increased flexion and extension torque at the end of each motion and this may affect athletic performance and a reduction in injuries (Doan et al, 2003). “X-factor” which means the resulting separation of the hip-shoulder alignment at the top of the down swing (Figure 1) and “X-factor stretch” which refers to the maximum X-factor angle after the top of the down swing are directly related to the golf swing performance (McLean, 1996; Cheetham, Martin, & Mottram, 2001). Cole and Grimshaw (2009) reported that higher X-factors were revealed in the elite golfers. The greater value of X-factor stretch was also demonstrated in the elite golfers (McLean, 2008). Therefore, improvement of golf swing can be gained from wearing spandex garment with compression band. Since actual effects of wearing spandex garment with compression band on gof performance are not established, the purpose of this study was to determine how spandex garment with compression band affects kinematic variables during a golf swing.

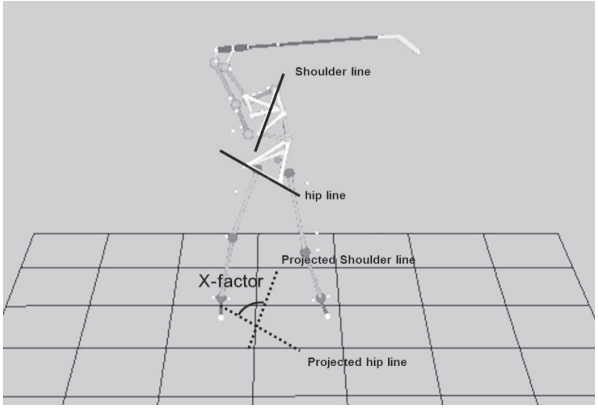

Figure 1: The definition of X-factor

METHODS: Eight male golf players (23.0±1.7 yrs, 176.5±4.6 cm, 778.7±103.8 N), each with at least 6 years golf experience (handy cap 4.4±5.5), were recruited for this study. All subjects performed golf swings with the modern swing technique using their own drivers. Kinematic data from six digital camcorders (Visol Inc., MotionMaster100, 200 Hz) were collected while subjects were asked to swing for two conditions (CG: control group, EG: experimental group, wearing Techfit Powerweb, Adidas) in random order. In each condition, subjects had tried to swing five times and the best trial was selected for analysing. Twenty two reflective markers on the body and three reflective markers on the club were attached respectively. For each trial being analyzed, nine critical instants (BA; ball address, MB; middle of back swing, TA; take away, EB; end of back swing, ID; initial of down swing, MD; middle of down swing, BI; ball impact, MF; middle of follow through, EF; end of follow through) were identified from the video recording. The X-factor, X-factor stretch, Hip rise, and Angular velocity of club were computed for each trial. For each dependent variable, a paired *t*-test was performed to test between two groups (α=0.05).

RESULTS: The X-factor in EG was decreased at EB but generally increased at ID, MD, and BI (Figure 2). The angular velocity of club in EG was greater at MD and BI (acceleration phase, Figure 3). However, the X-factor stretch in EG was less than the corresponding value in CG. The Hip rise (vertical location of left hip at critical instant - vertical location of left hip at BA) in EG was also decreased after ball impact.

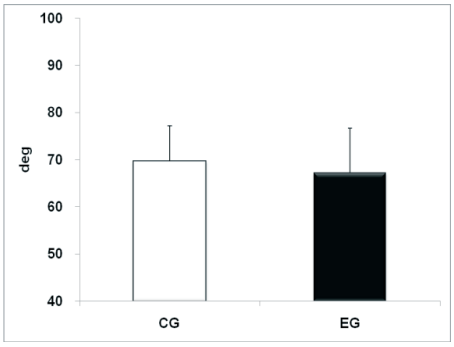

Figure 2: X-factor at EB

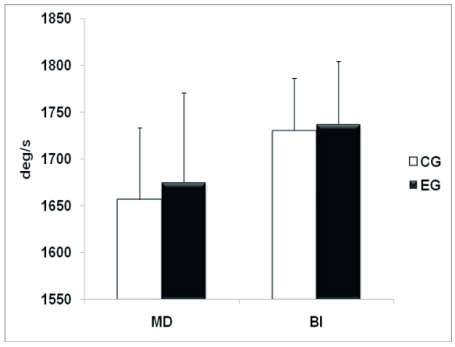

Figure 3: Angular velocity of club

DISCUSSION: For the down swing, the X-factor was generally greater in EG and the angular velocity of the club was increased at MD and BI. The X-factor in EG was less than the corresponding value in CG at EB. Myers et al. (2008) reported that increasing hitting distance can be possible by maximising the hip-shoulder separation angle to utilise the stretch shortening cycle during a golf swing. Gluck et al. (2007) proposed that the hip-shoulder separation angle has the potential to elevate the risk of low back pain by producing the excessive strain. These studies showed that the spandex garment with compressive band may contribute to the improvement swing performance by increasing X-factor during the down swing phase (active trunk rotation) and reducing the possibility of injury at the top of back swing (passive trunk rotation). However, other kinematic variables for evaluating the swing performance such as hip rise and X-factor stretch in EG did not indicate the positive effect of wearing spandex garment with compressive band. This means that the spandex garment may have greater functions in producing muscle force or muscle activation than those in kinematic variables.

CONCLUSION: All kinematic variables of interest were not significantly changed by wearing spandex garment with compressive band. Thus, wearing spandex garment with compressive band may not have benefit in terms of specific kinematic adjustment made to maximize golf swing. On the other hand, the spandex garment with compressive band may play an

important role in improving swing performance with performing greater muscle force or muscle activation. This has led to suggestions of the need for further kinetic and EMG analyses to evaluate its real function.

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