Investigation of lumbo-pelvic-hip muscle function, trunk/pelvis kinematics and joint loading in baseball pitching

**PRACTICAL SIGNIFICANCE**
The trunk muscle strength influences trunk kinematics during pitching. The 8-week training focusing on lumbopelvic-hip muscles improved ball speed and trunk muscle function in adolescent pitchers.

**STUDY BACKGROUND**
The throwing arm motion and loads on the shoulder and elbow joints during pitching are highly influenced by the movement of the proximal segments (i.e., trunk and pelvis). While the lumbopelvic-hip muscles are considered to play a critical role in controlling the trunk movement during pitching, direct evidence linking the lumbopelvic-hip muscle function and pitching biomechanics are currently lacking. Moreover, no study has evaluated whether the training that targets the lumbopelvic-hip muscle function can modify pitching kinematics or decrease joint loading.

**OBJECTIVE**
To 1) examine the relationship between lumbopelvic-hip muscle function and pitching biomechanics in baseball pitchers, and 2) evaluate the effects of 8-week lumbopelvic-hip training on muscle function and pitching biomechanics.

**MEASUREMENTS**
Lumbopelvic-hip muscle function (i.e., Y balance test, single-leg hop test, plank test, isometric hip and trunk strength, trunk rotational power) and pitching biomechanics variables were measured to evaluate the relationship between lumbopelvic-hip muscle function and pitching biomechanics. The assessments were repeated in 23 pitchers who completed the intervention and 25 controls after 8-weeks to study the intervention effects.

**RESULTS**
The weaker trunk rotation strength was associated with early trunk rotation, but not with greater joint kinetics. Intervention group pitchers improved ball speed, Y balance test in posterolateral direction, trunk flexion and rotation strength, hip abduction strength, and trunk rotational power.

**CONCLUSIONS**
The trunk muscle function influences trunk kinematics during pitching. The training program can improve ball speed and trunk muscle function. The analysis of the effects of intervention on pitching biomechanics is in progress.