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The effect of leg dominance on the frequency and 3D kinematics of soccer passing in female academy players

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INTRODUCTION:
The execution of sub-maximal passes using both feet is fundamental in football as it underpins possession retention and goal scoring. Biomechanical research has focussed on maximal kicks performed by male players. Limited analyses of female players have generally examined gender differences in adult populations. There is a need for female specific research especially within the youth development phase where skill acquisition occurs most easily (1). The aim of this study was to examine the effect of leg dominance on the frequency and 3D kinematics of sub-maximal passes in female academy players.
METHODS:
Twelve, female footballers (age: 13.7 ± 0.5 years) from an FA National League academy participated. The frequency and success rate of sub-maximal passes performed in a league game were established via live-match coding (SportsCode). 3D data were collected using a 12-camera Vicon motion capture system sampling at 240 Hz. 16 markers were attached to the lower body then using a 2-step run-up, participants completed ten sub-maximal passes, 5 on each leg towards a target (1.2m by 0.8m) 7m away. Temporal characteristics and kicking leg kinematics were calculated using Vicon Nexus, Pro-Calc and Matlab. Asymmetry was examined using paired-samples t-tests.
RESULTS:
Players completed more passes ($p = 0.000$) with a higher level of accuracy ($p = 0.028$) with their dominant leg. In dominant leg passes, the pelvis was consistently in a significantly more closed position relative to the target with the difference ($p = 0.020$) being largest at ball contact (Dom = -34.1 ± 96.6°; Non-Dom = -43.1 ± 6.5°). Increased pelvis obliquity with an elevated kicking side was also observed at maximum kicking leg knee flexion (Dom = -10.0 ± 4.5°; Non-Dom = -7.0 ± 2.7°). Other differences included a significantly shorter leg cocking phase ($p = 0.011$), significantly less ankle dorsiflexion at ball contact ($p = 0.039$) and the standing foot being positioned significantly closer to the ball ($p = 0.018$) when the dominant leg was used.
CONCLUSION:
The increased frequency and accuracy of sub-maximal dominant foot passes suggests that players only used their non-dominant foot when the match allowed for a lower level of accuracy (2). Superior accuracy with the dominant leg appears to be caused by increased technical proficiency. Less pelvis rotation away from the target and positioning the standing foot closer to the ball potentially created a smaller foot arc and encouraged players to strike through rather than across the ball (3). The increased pelvic obliquity during the leg acceleration phase could also have caused a rapid pelvis drop before ball contact which has been associated with improved foot speed and control. These findings provide important coaching cues for adolescent female footballers and highlight the need for further biomechanical research within this demographic.
REFERENCES:
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