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Lower extremity kinematic and temporal changes in adolescent baseball pitchers during a simulated game

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Abstract

Aim: To investigate whether adolescent baseball pitchers change lower extremity kinematic and temporal parameters during a simulated game, which may affect performance outcomes. **Method:** Twelve male adolescent pitchers (14 – 16 years) threw 90 pitches (6 sets of 15 pitches) from an artificial mound towards a pitching net. Angular displacements, angular velocities and temporal parameters at the hip, knee and ankle of the trailing and leading legs were collected throughout the pitching cycle. Dependent variables were analysed from the balance position through to maximal internal rotation of the shoulder. Performance outcomes of ball velocity and pitching accuracy were also recorded. The last five pitches of the second and final sets were compared to determine whether changes in the pitching mechanics and performance outcomes had occurred by the end of the simulated game. **Results:** Pitchers assumed a less upright posture and the leading leg was not raised as high at the balance position in the final set. Throughout stride phase, pitchers decreased maximal hip extension and ankle plantarflexion displacements in the trailing leg. Additional decreases in the maximal angular velocities for hip abduction and knee extension were seen throughout the stride phase in the final set. Foot contact occurred earlier in the final set, resulting in decreased hip flexion and increased hip abduction in the leading leg. No kinematic differences were observed between sets at ball release. Ball velocity and pitching accuracy decreased in the final set. **Conclusion:** Kinematic differences in the lower extremities suggest that lower extremity musculature may have been affected by fatigue by the end of the simulated game. Consequently, pitchers may have produced less forward momentum during the final set of pitches, which could have contributed to the decreased ball velocity. The altered balance position seems to be the underlying factor for the subsequent changes in the lower extremity pitching mechanics. Therefore, the leading leg hip flexors and the trailing leg hip and knee extensors may require strengthening to maintain the balance position. Additional

strengthening of the ankle plantarflexors would assist the hip and knee in producing consistent propulsive forces during the stride phase throughout a game.

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Table of contents

Abstract i
Acknowledgements ii
List of tables v
List of figures vi
1. Introduction 1
2. Literature review 5
2.1. The pitching cycle 5
2.1.1. Wind-up phase 6
2.1.2. Stride phase 7
2.1.3. Arm cocking phase 9
2.1.4. Arm acceleration phase 11
2.1.5. Arm deceleration phase and follow through 12
2.2. The kinetic chain 13
2.2.1. Lower extremities 14
2.2.2. Pelvis and trunk 23
2.2.3. Upper extremities 25
2.2.4. Timing and sequencing of movements 28
2.3. Fatigue 29
2.4. Summary 31
3. Methods 33
3.1. Participants 33
3.2. Marker placement 33
3.3. Data collection 35
3.4. Data processing and analysis 36
3.5. Statistical analysis 38
4. Results 40
4.1. Displacements 40
4.1.1. Maximal angular displacements 40
4.1.2. Displacements at events 40
4.2. Angular velocities 41
4.2.1. Maximal angular velocities 41
4.2.2. Angular velocities at events 41
4.3. Temporal parameters 42

4.4. Performance outcomes 42
4.5. Variability of the angular displacements at the balance position 43
5. Discussion 52
5.1. Balance position 53
5.2. Stride phase 55
5.3. Acceleration phase 58
5.4. Clinical implications 59
5.5. Limitations 61
6. Conclusion 65
7. References 66

List of tables

Table 4.1. Comparison of the mean ± SD maximal angular displacements (deg) during the stride phase in the baseline and final sets. 44

Table 4.2. Comparison of mean ± SD displacements at events between the baseline and final sets. 45

Table 4.3. Comparison of mean ± SD angular velocities (deg. s^{-1}) between the baseline and final sets. 46

Table 4.4. Comparison of mean ± SD values for temporal parameters between the baseline and final sets. 47

Table 4.5. Comparison of mean ± SD pitching performance outcomes between the baseline and final sets. 48

Table 4.6. Variability of the angular displacements at the balance position for the pitches of the baseline and final sets (ICC [95% Confidence Interval]). 49

List of figures

Fig. 3.1. Anterior and posterior view of the marker set for a right-handed pitcher (scapula, ulna, radius and hand clusters on the left arm for left-handed pitchers). Solid black circles identify rigid clusters of markers, grey circles identify single markers and white circles identify the single markers used only for calibration. 34

Fig. 4.1. Mean ± SD leading leg angular displacements (deg) during the baseline (green line) and final (red line) sets over the duration of the pitching cycle (% pitching cycle). Balance position occurs at 0% pitching cycle and maximal shoulder internal rotation occurs at 100% pitching cycle. The vertical lines at approximately 67% pitching cycle indicate when foot contact occurred during the baseline (green line) and final (red line) sets. The vertical lines at approximately 78% pitching cycle indicate when ball release occurred for the baseline and final sets. * indicates significant differences in the angular displacements between sets ($p < 0.05$). † indicates a trend towards a significant difference between sets ($p < 0.10$)..... 50

Fig. 4.2. Mean ± SD trailing leg angular displacements (deg) during the baseline (green line) and final (red line) sets over the duration of the pitching cycle (% pitching cycle). Balance position occurs at 0% pitching cycle and maximal shoulder internal rotation occurs at 100% pitching cycle. The vertical lines at approximately 67% pitching cycle indicate when foot contact occurred during the baseline (green line) and final (red line) sets. The vertical lines at approximately 78% pitching cycle indicate when ball release occurred for the baseline and final sets. * indicates significant differences between sets ($p < 0.05$). † indicates a trend towards a significant difference between sets ($p < 0.10$)..... 51