

Differences in strength and cutting and jumping technique between ACL-injured and non-injured team handball players – a case-control study

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Objectives: Non-contact ACL injuries represent a major problem in ball/team sports, especially for females, and the long-term effects are alarming. A five-year prospective cohort study to identify risk factors for ACL injuries has recently been initiated in the elite series of Norwegian female team handball. The baseline testing includes 3D motion analysis of jumping and cutting movements, as well as tests of strength, flexibility, balance, coordination and anatomical alignment. **Methods:** A total of 184 players (18 with previous ACL injury, 14 with unilateral reconstructed injury) have been tested. The present investigation includes tests for isokinetic quadriceps and hamstrings strength, isometric hip abduction strength, leg press strength, hamstrings mobility, navicular drop, hip anteversion, knee laxity and generalised joint laxity. **Results:** Players with previous unilateral ACL injuries were compared with non-injured players. The data analysis showed that the injured players had greater hamstrings mobility than non-injured players ($154\pm 2.5^\circ$ vs. $144\pm 0.9^\circ$, $p=0.002$) and greater hip abductor strength when the non-injured side was compared with non-injured players (13.7 ± 0.7 kg vs. 10.9 ± 0.2 kg, $p<0.001$) and. No differences were found between the groups in generalised joint laxity, legpress, navicular drop, hip anteversion or knee laxity. However, injured players had lower isokinetic quadriceps and hamstrings strength in their injured compared to their non-injured leg (163 ± 8 vs. 181 ± 7 Nm, $p=0.048$ and 98.5 ± 6.6 vs. 107 ± 5.4 Nm, $p=0.042$). No difference was found in the ratio between hamstrings and quadriceps strength (0.61 ± 0.04 vs. 0.59 ± 0.02 , $p=0.658$). Among previously injured players, there were no significant differences between legs in hamstrings mobility, knee laxity, navicular drop or isometric hip abductor strength. **Conclusions:** The ACL-injured players were generally at least as strong as the non-injured group, but have returned to elite level pivoting sport with strength differences between the injured and the non-injured leg. Such side differences may leave the players prone to new injuries. Further analysis of 3D motion data will reveal whether previously ACL-injured players have developed techniques involving different loading patterns between legs or motion patterns that differ from non-injured players.

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