

Longitudinal Change in Knee Cartilage Thickness and Subchondral Bone Area in Adolescent Athletes

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Objective: It is unclear whether joint cartilage thickens during growth, and whether thickness changes differ between girls and boys. The objective was to compare a potential increase in knee cartilage and subchondral bone areas (SBA) between young male and female athletes at the end of adolescence.

Methods: The dominant legs of 16 young top volleyball players (Olympiastuetzpunkt Berlin; 8 female, 8 male; age 15-17 years) were studied. Baseline and two-year follow-up MR images were acquired, and the thickness and SBAs of the medial and lateral tibial and femoral cartilages were computed after segmentation. Differences between both sexes were computed using unpaired t-tests.

Results: The increase in total femorotibial cartilage thickness was +2.7% (95% confidence interval: +1.1; +4.1) and amounted to +2.2% in boys (-0.5; +4.8) vs. +3.3% (+1.6; +5.0) in girls. The difference in the rate of change was not significant ($p=0.867$). The increase in femorotibial SBAs was +1.0% (+0.4; +1.6), and amounted to +0.8% in boys (-0.2; +1.9) vs. +1.2% (+0.2; +2.1) in girls. Again, the difference was not significant ($p=0.871$).

Conclusion: A substantial increase in femorotibial cartilage thickness (and SBAs) was observed in young athletes towards the end of adolescence, i.e. a period during which the epiphyseal line is closing. These differences did not differ significantly between boys and girls. This thickness increase must be taken into account when determining longitudinal cartilage change in young athletes after injury, in order to adequately differentiate pathological (post traumatic) change from that occurring physiologically.