

TIBIAL CARTILAGE VOLUME OF THE BACK LEG VERSUS THE HIGHER LOADED FRONT LEG IN ELITE MALE AND FEMALE ENGLISH CRICKET FAST BOWLERS

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Purpose

The aim of this study was to determine if the fast bowling action in cricket, during which the front leg experiences about twice the loading of the back leg, causes a clinically significant difference in the normalized medial or lateral tibial cartilage volume of the higher loaded front versus the back leg.

Methods

Ten male and six female healthy elite English cricket fast bowlers had 3T MRI scans (3D sagittal FIESTA) collected for both knees after the conclusion of the most recent season. Manual segmentation was used to calculate the cartilage volume and tibial surface area of the medial and lateral tibial compartments. Compartmental cartilage volumes were normalized by compartmental bone surface area to allow for the combination of male and female bowler measurements (compartmental cartilage volume divided by compartmental tibial surface area). The percent differences between the front and back leg normalized tibial measurements were calculated and compared to the established minimal clinically important difference (MCID) of 6.6% for knee cartilage volume change in OA. Percent differences were calculated assuming back leg measurements as initial values.

Results

The cricket bowlers were aged 17 to 31 (mean age 21.8) and had played an average of 3.9 years at an elite level. The percent differences of normalized compartments were calculated for all bowlers' (n=16) medial compartment and for 8 bowlers' lateral compartment due to missing lateral compartments in the scans of 8 male bowlers. A difference greater than the MCID of 6.6% was seen in the normalized lateral tibial compartment in the female (11.9%, n=6) and total (7.7%, n=8) samples; the positive percent difference suggests the higher loaded front leg has a greater lateral tibial measurement than the back leg. A difference greater than the MCID was also seen in the normalized medial tibial compartment in the female sample (-7.8%); the negative difference suggests the higher loaded front leg has a lesser medial tibial measurement than the back leg.

Table 1. Percent differences (assuming back leg as initial value) for the normalized medial and lateral tibial compartments.

Compartment	Total (N=16)	Male (N=10)	Female (N=6)
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Normalized Medial Tibia Cartilage Volume	-1.6%	-0.7%	-7.8%
Normalized Lateral Tibia Cartilage Volume	7.7%*	-- □	11.9%
*N=8 due to missing lateral tibial compartments in the men			
□ Not included due to missing lateral tibial compartments in the men			

Conclusions

In this sample of elite cricket fast bowlers, the lateral tibia compartment had a clinically significantly larger measurement in the higher loaded front leg than the back leg. However, the female medial tibia compartment had a clinically significantly smaller measurement in the higher loaded front leg than the back leg. The differing responses of each compartment suggest that the tibial compartments experience different bowling loads. The front leg medial compartment may experience a much greater, deleterious load compared to the lateral compartment, resulting in the smaller medial measurement. Concurrently, the front leg lateral compartment may experience a healthy loading resulting in a positive adaptive response compared to the back leg. Further biomechanics investigation is required to determine how the loading of elite bowling affects tibial cartilage.