Objective To identify differences between injured and uninjured athletes for ACWR based on workload quantity, magnitude, and weighted magnitude.
Design Matched-pair cohort.
Setting Youth basketball.
Participants Fifty (25F, 25M; 16.5 years; 66.2 kg; 173.5 cm) basketball players on four high school teams.
Assessment of Risk Factors A wearable device (VERT® Classic) was used to record jump count and jump height for all participants during practices and games throughout the 17-week season.
Main Outcome Measurements Ten athletes were diagnosed with either patellar or Achilles tendinopathy, and were matched by height and weight with teammates that had no injuries. ACWRs were calculated weekly for three workload types: jump count, jump height, and jump height weighted for tendon damage. Paired t-tests compared mean ACWR of injured and uninjured athletes for each measure of workload.
Results There was no significant effect of injury status for jump count ACWR (injured mean (95% CI): 1.077 (1.011–1.132), uninjured: 1.025 (0.906–1.162); p=0.121) or jump height ACWR (injured: 1.079 (1.015–1.136), uninjured: 1.018 (0.886–1.155); p=0.081). ACWR with jump height weighted for tendon damage was higher for injured (1.075 (0.929–1.243)) compared to uninjured athletes (0.939 (0.729–1.266); p=0.045).
Conclusions Athletes with patellar or Achilles tendinopathy have a greater ACWR than uninjured athletes when workload is calculated as jump height weighted based on tendon properties. This result was not apparent when ACWR was based on the number of loading cycles or the unweighted loading magnitude. Future research into overuse injury prevention should consider the damage accumulation in biological tissue due to repetitive loading.

084 MONITORING WORKLOAD TO EVALUATE INJURY RISK: THE IMPACT OF MISSING DATA

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Background The acute: chronic workload ratio (ACWR) is used to monitor workload, with both low and high ACWR associated with injury risk. Ignoring or imputing missing data points may influence ACWR calculations.
Objective To examine the effect of ignoring versus imputing missing data on ACWR.
Design Cohort, longitudinal.
Setting Youth basketball.
Participants Fifty (25F, 25M; 16.5 years; 66.2 kg; 173.5 cm) basketball players on four high school teams.
Assessment of Risk Factors Participants wore a jump counter (VERT® Classic) to record external workload during practices and games throughout the 17-week season.
Main Outcome Measurements Two datasets were created: missing data were ignored, and missing data were imputed using a machine learning algorithm based on typical jump counts for the individual, team and sex. The distribution of ACWR was compared between datasets using a two-sample Kolmogorov-Smirnov test. Pearson correlations were used to assess how the ACWR for the ignored and imputed datasets relate to the difference between the percent of missing acute and chronic data.
Results The distribution of ACWR was significantly different between the ignored and imputed datasets (D=0.164, p<0.001). The ignored dataset had 40% more cases of ACWR<0.5 and 97% more cases of ACWR>2.0 than the imputed dataset. There was a significant moderate association between ACWR and the difference between the percent of missing acute and chronic data for the ignored dataset (rho=0.617, p<0.001). When more acute than chronic data are missing, ACWR is low; when more chronic than acute data are missing, ACWR is high. There was no relationship between missing data and ACWR for imputed data (rho=0.061, p=0.147).
Conclusions When missing data are ignored, ACWR is dependent on the quantity of missing acute and chronic data. Additionally, ignoring rather than imputing missing data is likely to result in more extreme ACWR, which could influence evaluation of the relationship between workload and injury risk.

Poster Presentations

085 THE IMPACT OF OVERHEAD SPORTS: ASSESSMENT OF SHOULDER RANGE OF MOTION IN 1ST LEAGUE PROFESSIONAL VOLLEYBALL PLAYERS

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Background Throwing is a highly skilled movement performed at the extremes of glenohumeral motion.The constant microtrauma in the throwing shoulder challenges the physiologic limits of the surrounding tissues and leads to modifications in range of motion, due to osseous and soft tissue adaptations.
Objective We aimed to characterize the changes that occur in glenohumeral mobility in volleyball players, determining if these would be different compared to other overhead sports and if differences existed between the two shoulders.
Design This was a cross-sectional study, with clinical data collected from questionnaires and functional evaluation using a goniometer.
Setting The subject group consisted of volleyball players from the major league and/or the national team.
Participants The selection criterion was being a volleyball masculine athlete of a major competition without shoulder complaints; this enrolled a total of 66 professional males.
Interventions Bilateral range of motion (active and passive) was assessed with a goniometer, in both throwing and non-throwing shoulder. We also tested stability.
Main Outcome Measurements We measure forward elevation, extension, external and internal rotation. The specific tests were apprehension, anterior and posterior drawer, and the sulcus sign.