Pre- and In-Season Strength and Conditioning Training Changes in Leg Peak Power Performance in Collegiate Division II Women's Basketball Team: A Case Study

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ABSTRACT

Basketball is a team sport that places emphasis on explosive movements. Leg peak power (PP) performance provides an advantage for successful basketball participation. Pre-season (PS) strength and conditioning training (SCT) sets the foundation for in-season (IS) success. However, determining the optimal duration, of PS and IS SCT to develop improvements in PP is still under investigation. **PURPOSE**: To describe the changes over time in PP during a 4 weeks of PS and 6 weeks of IS SCT in a collegiate Division II women's basketball team. **METHODS**: Besides PS in-court sessions (4.5 hrs/wk), 14 female players completed 3 hrs/wk of SCT. During the IS, the in-court sessions increased (10 hrs/wk), while the SCT reduced to 2 hrs/wk, focusing on strength (weeks 5-8), then on strength and power (weeks 9 and 10). All SCT sessions were supervised by SCT coach. PP was assessed 1 d/wk for 10 weeks by the counter-movement jump (CMJ) test performed on the Just Jump© mat. PP was calculated based on Sayers formula. PP data were normalized for body size using allometric scaling, from recorded PP scores and body mass (M) ($PP_n=PP/M^{0.67}$). PP scores were analyzed using one-way repeated measures ANOVA. Missing values were replaced with series mean. Statistical significance was set at $p \le 0.05$. All statistical analyses were performed using SPSS© (vs.25). **RESULTS**: Mauchly's test indicated that assumption of sphericity has been violated, x^2 (44) = 96.58, p = 0.000, therefore Greehouse-Geisser corrected tests are reported (ε = 0.41). PP scores were significantly different between the 10 weeks of SCT, F (3.65, 47.40) = 4.80, p = 0.003, η^2 = 0.270. Post hoc test using the Bonferroni correction revealed that SCT increased PP scores at week-3 compared to week-1 and week-2, but that increase was not significant (225.03 ± 16.50 W · kg$^{-0.67}$ vs 212.90 ± 17.01 W · kg$^{-0.67}$, p = 0.69 and 214.01 ± 19.13 W · kg$^{-0.67}$, p = 0.41). PP scores for week-7 (209.19 ± 13.5 W · kg$^{-0.67}$) were significantly different than week-3 and week-4, and week-5 (225.03 ± 16.50 W · kg$^{-0.67}$, p = 0.01; 219.69 ± 13.33 W · kg$^{-0.67}$, p = 0.02; 218.12 ± 12.98 W · kg$^{-0.67}$, p = 0.01). Following week-7, PP scores increased but not significantly at week-8 and week-9 (211.46 ± 12.30 W · kg$^{-0.67}$, p = 1.00; 214.24 ± 15.18 W · kg$^{-0.67}$, p = 0.67) and then at week-10 (212.36 ± 10.78 W · kg$^{-0.67}$, p = 1.00) PP scores non-significantly decreased below to week-1 scores. **CONCLUSION**: SCT on PP performance in women's collegiate DII basketball athletes during PS and IS are subjected to the time devoted on SCT itself. Three hrs/wk for 3 weeks seems to be adequate stimulus to elicit an increase PP. Continuing a SCT program for more than 3 weeks with less than 3 hrs/wk is not enough to maintain the already achieved adaptations. More than 7 weeks and up to 10 weeks of SCT with 2 hrs/wk has no influence on improving PP above baseline week one values. Time constraint is at expense of SCT. For SCT and basketball coaches, this study may be a useful tool when developing a periodized SCT program focusing on strength and power adaptations.