

YOUNG FEMALE ATHLETES AND KNEE EXTENSOR AGE-RELATED PROFILE

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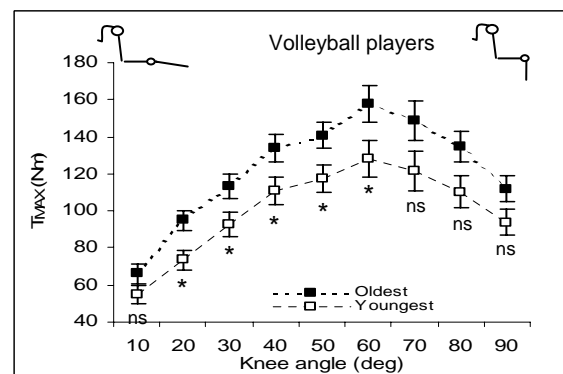
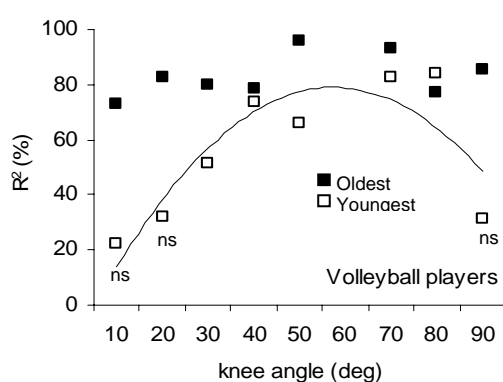
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INTRODUCTION: Muscular strength can be likened to a skilled act (Kraemer and Newton, 2000) and is increased during developmental age (Van Praagh and Dore, 2002). Thus when higher mechanical loading occurs over a different knee angle range, such as in the track & field jumpers (TFJ) (Graham-Smith and Lees, 2005) and the volleyball players (VP) (Tokuyama *et al.*, 2005), a sport and age-related profile may be exhibited in young athletes not only for maximal torque levels but also for the relations between the torque at the peak of the torque-angle curve and the torque at other knee angles (angle-angle (A-A) relationships).

METHOD: Subjects were young (13-19yrs) female TFJ (n=20) and VP (n=21) divided into the youngest (≤ 16.449 yr) and the oldest age category (≥ 16.500 yr), similarly to the official competitive categories. The maximum knee extensor isometric torque (T_{MAX}), developed "as fast and hard as possible", was measured at 9 knee angles (10° increments randomized across subjects, from 10 to 90° , 2min rest). Statistics included ($p < 0.05$), A) two way ANOVA (2 (Age or Group) X 9 (Angle)) for T_{MAX} differences between the age categories or pair of groups, respectively, B) the Pearson's coefficient of correlation (r) squared (R^2) and expressed as a percentage (%) for the A-A relationships and C) quadratic and linear curve fitting to the joint angle R^2 trendlines, separately for each group and each age category.

RESULTS & DISCUSSION: The same strength levels in both the youngest and the oldest TFJ ($p > 0.05$), may be attributed to the demands for high muscular strength already from early training years (Kraemer and Newton, 2000), since they must overcome their whole body mass with just half of their lower extremities potential. The dominance of team tactical skills rather than strength in their training context, in combination with the developmental process (Van Praagh and Dore, 2002), possibly account for the significant greater T_{MAX} in the oldest than the youngest VP ($p < 0.05$). Almost all A-A relationships were significant at $p = 0.000$ and, with the exception of the oldest VP, they were described by significant quadratic R^2 joint angle trendlines, however, a greater R^2 decrease was observed at the more extended or more flexed knee angles in the youngest than the oldest TFJ underlining the sport and age-related influence on the knee extensor A-A relationships.



CONCLUSION: The age category as well as the sport-specific knee angle range should be accounted for when treating young athletic females 13-19yrs who are still in a developmental phase both technically and physically.

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