

ISOKINETIC STRENGTH RATIOS AND RANGE OF MOTION OF THE SHOULDER ROTATOR MUSCLES IN PORTUGUESE MALE JUNIOR (16-18) TENNIS PLAYERS

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INTRODUCTION

The goal of the present work was to characterize the shoulder muscle balance between the internal and external rotator muscles in Portuguese male tennis players (ages 16-18).

METHODS

32 young male tennis players classified in the first 50 of the junior (aged 16-18) Portuguese ranking of 2005 participated in the study. Concentric strength measures of ER and IR for both arms were performed on a Biodex Medical System isokinetic dynamometer at 90 and 180°/s. During testing the subjects were seated, the arm was positioned in 45° abduction in the scapular plane and elbow flexed to 90°. Based on a reference position (0°) with the forearm horizontal, rotation movements were performed between 15° of IR and 60° of ER, with a 75° of range motion. The ROM of the ER and IR movements of both shoulders was passively measured by goniometry with the subject lying supine on a table with the arm abducted 90° and the elbow flexed 90°. Mean values and SD were calculated for the isokinetic force and amplitude parameters. To analyse dominant (D) to non-dominant (ND) arms differences the paired samples T test was used ($p < 0.05$). Correlation coefficients were measured to determine relationships between variables.

RESULTS AND DISCUSSION

With the exception of Peak Torque/Body Weight of ER, all the isokinetic parameters of ER and IR force were significantly ($p \leq 0.05$) higher in the D arm at both velocities. The mean values of ER:IR ratio observed in the D arm (0.61 ± 0.10 at 90° s⁻¹, 0.63 ± 0.09 at 180° s⁻¹) were lower than in the ND arm (0.67 ± 0.13 at 90° s⁻¹, 0.67 ± 0.11 at 180° s⁻¹) but significant differences were only found at 90° s⁻¹ ($p \leq 0.014$). With respect to shoulder flexibility, there was significant ($p \leq 0.0001$) less ROM of IR and significant ($p \leq 0.001$) higher ROM of ER in the D shoulder. The total rotation arc was significantly ($p \leq 0.05$) reduced in the D shoulder ($158.6 \pm 19.3^\circ$) when compared with the nondominant shoulder ($166.2 \pm 23.7^\circ$), meaning that the loss of IR in the dominant side exceeds the gain in the ER amplitude. Negative significant correlations were found between age and ROM of D ($r = -0.458$; $p \leq 0.01$) and ND arm IR ($r = -0.510$; $p \leq 0.01$). A positive significant correlation ($p \leq 0.001$) was found in the ROM between both shoulders in both movements, IR ($r = 0.787$) and ER ($r = 0.679$). We also found a positive correlation ($p \leq 0.05$) between shoulders in both velocities and movements for all the isokinetic force parameters (PT, PT/BW, TW, AP), indicating that, independently of the specific shoulder adaptations produced by tennis training, the shoulder flexibility and strength depend on the individual characteristics.

CONCLUSIONS

Our results with Portuguese junior tennis players confirm adaptive changes in the dominant arm of tennis players (16-18): deficit in external rotator strength combined with loss in stretching capacity. Those adaptations may predispose the tennis player to shoulder instability and injury.

Keywords:

muscle balance, shoulder, tennis

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