

Abstract

Title: Kinematic analysis of the toss in relation to the success of serving in tennis

Objectives: The aim of this master's thesis is to conduct a kinematic analysis of the toss, determine the impact the serve will have on the success of the first serve among competitive and recreational female players and compare these data with results of male serves obtained in the bachelor's thesis.

Methods: To obtain the results, a method of indirect observation was used, during which video recordings were made of 8 competitive and 2 recreational female players. Each player executed a total of 40 first direct serves, and the partial videos were then analyzed using Dartfish 10 software. We observed the maximum point of the serve and the ball contact, and each serve was categorized as successful, net, out – on the side, or out – long. Data obtained from the video recordings were subsequently processed using effect size analysis (Cohen's *d*) and statistical significance (ANOVA).

Results: Analysis of variance for repeated measures showed a statistically significant difference between individual serve categories on the Y-axis, i.e., maximum toss height, $F(3,21) = 7.16, p = 0.002, \eta^2 = 0.013$. Post-hoc tests for pairwise comparisons revealed a significant difference in maximum toss height between serving into the net vs. out – on the side ($p = 0.031$); between successful serving vs. out – on the side ($p = 0.025$); and between out – long vs. out – on the side ($p = 0.026$). There were no significant differences on the X-axis. In both the vertical and horizontal planes, minimal differences were observed among competitive female players, both at the peak of the toss and at the ball impact. Competitive players were able to adapt their movement speed and coordination to hit the ball consistently at the same height and distance from the baseline regardless of the height or distance from the baseline of the serve. The overall average range of shots hit by female competitive players was smaller compared to male competitive players, both in the horizontal and vertical planes. A common trait among competitive players, regardless of gender, was that balls hit farthest from the baseline tended to land in the net.

Keywords: tennis, observation, hit, player, game performance