BIOMECHANICAL ANALYSIS BETWEEN BADMINTON FOREHAND AND BACKHAND SMASH STROKES

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Introduction

The badminton skills are divided into two types, the forehand grip and the backhand grip. Previous studies focused on the description of forehand strokes of Badminton players, such as, Poole, 1970; Adrian, 1971; and Gowitzke, 1979, they used 2D model to describe the smash strokes. Tang, et al, 1995 who used 3D model to measure the rotation of the forearm and the wrist, Tsai, et al, 1996, compared the smash and the jump smash of elite players with 3D model. The purpose of this study was to analyze the kinematics variables of the elite badminton players in Taiwan when they were performing the forehand and the backhand smashes.

Methods

Four Taiwan male right-handed badminton elite players were served as the subjects for this study. A successful trial was that the subject would hit the shuttle traveling down the line through the opposite court, and landed to the location that no more than 80 cm from the side line. Two Redlake1000 high-speed digital cameras (250Hz) were used to record the 3D kinematics data. The 3D DLT method and the body segment parameters (Dempster 1955) were employed to calculate the kinematics variables of the body. A t-test and the Pearson product moment correlation were used to test the selected variables at .05 significant levels.

Results

The duration time of contact in the forehand smash (0.004 sec) was as long as the time of the contact time in the backhand smash. The initial velocity of the forehand smash was 76 m/s, the initial velocity of the backhand smash was 56 m/s. The variables of forehand smash and backhand smash during contact are shown in table 1 and graph 1, 2 as followed.

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<tbody>
<tr>
<td>Forehand</td>
<td>76</td>
<td>-4</td>
<td>2.47</td>
<td>72</td>
<td>172</td>
<td>192</td>
<td>181</td>
<td>636</td>
<td>738</td>
<td>1861</td>
</tr>
<tr>
<td>Backhand</td>
<td>56</td>
<td>-4</td>
<td>2.28</td>
<td>82</td>
<td>155</td>
<td>191</td>
<td>198</td>
<td>230</td>
<td>888</td>
<td>1496</td>
</tr>
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| t-test    | *                | *                |                   |                   |                   |                   |                   |                      |                      |                      |
| r         | *                | *                |                   |                   |                   |                   |                   |                      |                      |                      |

*p< .05

Discussion / Conclusions

The results showed that the forehand smash was significant greater than the backhand smash in the initial shuttle velocity and the contact height. There was a positive correlation between shuttle velocity and the wrist angular velocity in the backhand smash. And there was a negative correlation between the shuttle velocity and contact height in
backhand smash. The angular velocity patterns at the contact of the forehand smash and the backhand smash were similar (wrist > elbow > shoulder). It obeyed the rule of the kinetic chain.

References