



Figure 1: Means of the different variables

The graph above, shows the differences between the means of the selected variables of Spike and Jump Serve

4. Discussion

As shown in the Table 3 and 4 the variables that were found to be significant at 0.05 level are the angle of right ankle at first step (2.352), angle of right ankle at third step (-3.843), angle of left ankle at third step (-3.641), angle of left hip at first step (2.306) and angle of right knee at first step (2.605). This means during approach run of spike and jump serve there is no significant difference found except in those of the angle of right ankle at first step, angle of right ankle at third step, angle of left ankle at third step, angle of left hip at first step and angle of right knee at first step. However, linear kinematic variables i.e., height of c.g. at first, second and third step of spike and height of c.g. at first, second and third step of jump serve and stride length at first, second and third step of spike and stride length at first, second and third step of jump serve did not showed significant difference. The findings of the study have shown that only in case of angle of right ankle at first step, angle of right ankle at third step, angle of left ankle at third step, angle of left hip at first step and angle of right knee at first step, at the time of approach

run of spike have shown significant difference to that of the same variables of the approach run of jump serve. There are significant differences between the angle of left ankle in third step of spike (94.60°) and the angle of left ankle in third step of jump serve (117.80°) and in between the angle of right ankle in third step of spike (86.80°) and the angle of right ankle in third step of jump serve (109.60°).

This is probably because in spike a lower stance is attained in third step than jump serve in order to lower down the body for more eccentric contraction and also to thrust the body downward to gain more amount of ground reaction force which helps the players to jump higher. As in jump service player also requires great amount of vertical jump same as spike but in jump serve players also have to cover horizontal distance along with the vertical distance so that they are able to contact the ball more closer to the net which gives less time to react opponent receiver's.

Hence more amount of planter flexion is seen during the moment take off of jump service than spike. A lower stance by the spiker may help to maintain dynamic balance. By keeping the body lower helps him resist the forward momentum and so does the horizontal displacement after

take-off. As, it is needed for the spiker to hit the ball at the maximum height, which is only possible, when the horizontal displacement is compromised to the vertical displacement.

But in jump serve the server needs to cover a greater horizontal distance so that the distance covered by the ball will be less and its velocity will be more. And in order to do so, the server attains a higher third step before take-off. Higher the C.G. of the body, greater will be the moment of inertia in the forward direction. Hence, the body will have greater forward momentum and greater horizontal displacement.

A significant difference is seen between the angle of right ankle in first step of spike (115.80°) and the angle of right ankle in first step of jump serve (89.40°). Also there is significant difference between the angle of right knee in first step of spike (164.60°) and the angle of right knee in first step of jump serve (143.20°).

This is because, during jump serve the ball is self tossed and in order to toss the ball to an optimum height a remarkable amount of force is required. So, to generate the force the lead leg is more flexed from the ankle and knee. As the force is exerted to toss the ball some amount of force is to be applied on the ground with the extension of the ankle and knee joint. The law of 'transfer of force from part to whole', provide evidence that to toss the ball higher the force is applied via the ankle, knee, hip and shoulder joints simultaneously.

Whereas, in the first step of spike the spiker accelerates in a forward direction as he initiate the approach run. The spiker attains a upright position or less forward inclined position because there is no need of force to be applied vertically. A significant difference is found between the angle of left hip in first step of spike (170.20) and the angle of left hip in first step of jump serve (153.60).

This is probably because in jump serve the server in order to toss the ball high enough lowers the torso from hip joints at the initial stance (first step), whereas, in spike downward inclination of the torso is not needed in the first step as the body takes the approach run.

5. Conclusion

The following angular kinematic variables showed significant difference between the steps of approach run in spike and jump serve in volleyball:

The angle of right ankle at first step (2.352), angle of right ankle at third step (-3.843), angle of left ankle at third step (-3.641), angle of left hip at first step (2.306) and angle of right knee at first step (2.605).

Finally, we must close the gap between practitioners and biomechanists. It will be important to standardize terminology and to agree on reporting conventions, once new biomechanical knowledge is gained, it is the responsibility of the research community to present it to athletes in an understandable manner. On the whole, the

significance shown by the variables clearly mean that these variables are contributing to the skill of spike and jump serve differently. More research should be carried out in relation to biomechanical analysis of different skills in volleyball and with more subjects.

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References



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