THE VOLLEYBALL APPROACH: AN EXPLORATION OF RUN-UP LAST STRIDE LENGTH WITH JUMP HEIGHT AND DEVIATION IN LANDING

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The main aim of present research was to find out a significant correlation between approach run-up last stride length and the height of jump and landing deviation. Fourteen top elite volleyball players have been served for this study. A Mikro-Mak Motion Analyzer with Win-Analyze program has been used for this study. A Philips video camera with 240 frames per second has also been used to better trace the markers on the shoulder, hip, knee, ankle, and toe. The program enabled us to find out the displacement and velocity of all parts and especially the toes' in order to measure the different last stride lengths and the deviation from vertical axis. Although we were expecting to get a significant correlation between this parameter and jump height, as in long stride the CG is displaced in longer range with higher horizontal motion than when the player jumps with shorter stride, but the findings did not support this idea. The results are given in Tables 1-4.

Keywords: run-up stride length, jump height, landing deviation

INTRODUCTION:

The approach is a critical component of a successful offense in volleyball. Ideally, the spiker will use the approach to achieve a high jump with minimal horizontal motion and maximal vertical motion Prsala (1982); Hudson (1986). But according to Dusault (1986), greater height in jump is predicated on greater horizontal velocity in the approach and so far it is believed that the spiker should maximize horizontal velocity at touch-down and minimize it at take-off, in order to achieve a remarkable height.

The game involves many physical skills and successful performance is highly related with an individual's ability to propel themselves into the air during both offensive and defensive maneuvers. In both of these ballistic activities the need of higher jump is obvious. It is important to consider that spikes and blocks are not only jumps, but jump-landing sequences. During the execution of a jump spike, the player jumps high into the air strikes the ball at the highest point of their jump in an effort to propel the ball rapidly and purposefully downwards the opposing side of the net, Coleman (1993). Nearly all the landings were bilateral landing technique in order to not lead to loss of balance (Kovacs et al., 1997).

Previous research on jumping and spiking has concentrated on the implications of impact and determination of the ball velocity Shahbazi (2002). The purpose of this study was to explore balance and skill in the volleyball approach in run-up last stride, which seemed important for performing an effective and purposeful power spike.

METHODS:

Fourteen adult male volleyball players at National Team level (age=19.4± 4.94 yrs, height=191± 3 cm, and mass=76.67±10.51 kg) served as subjects in this study. Each subject executed several approach jumps with different stride lengths: normal, short, and long. The starting location and a pseudo net were adjusted until realistic jumps were achieved. The data were collected through Kodak camera at 240 Hz and analyzed by Win-Analyze software (Mikro-Mak System). Subjects were encouraged to produce maximal effort, but were not verbally coached on any of the variables of this study. Reflective markers were placed at estimated joint centers and the right side of the subject was video filmed. Each type of strides was categorized by corresponding jump. Each videotape was played back manually (frame

by frame) in order to accurately observe several aspects of stride length, jump, and landing. Each activity was categorized by stride length type (long, short, and normal) and phase (jump or landing).

RESULTS AND DISCUSSION:

The study was designed to evaluate the effect of run-up last stride length on jumping height and deviation in landing techniques utilized by fourteen expert male volleyball players. All of offensive jumps were performed using both feet, which we believed that jumping with both feet provides a wide base of support resulting in stable force production and allowing the forces to be generated by both limbs for maximal vertical performance. All the landings were made with two feet than one to ensure good landings with minimum deviation.

The deviation from vertical line in landing may be characterized by the following traits: a forward flexed and rotated back, hip adduction and internal rotation, knee flexion and vagus positioning, external tibial rotation, and a lack of control of opposite foot. In this position, the muscles that would normally help the athletes remain erect cannot function properly because they were working at different mechanical positions before jumping.

In terms of deviation, of fourteen subjects exhibited positive deviation of CG (centre of gravity) at landing. The exception was the most skilled subject who had negative deviation of CG at landing. A broader interpretation of these results is limited by the fact that deviation is rarely measured in vertical jumping studies. However, the present deviations are similar to but larger than the deviations reported for an intermediate jumper Spina et al.(1996),

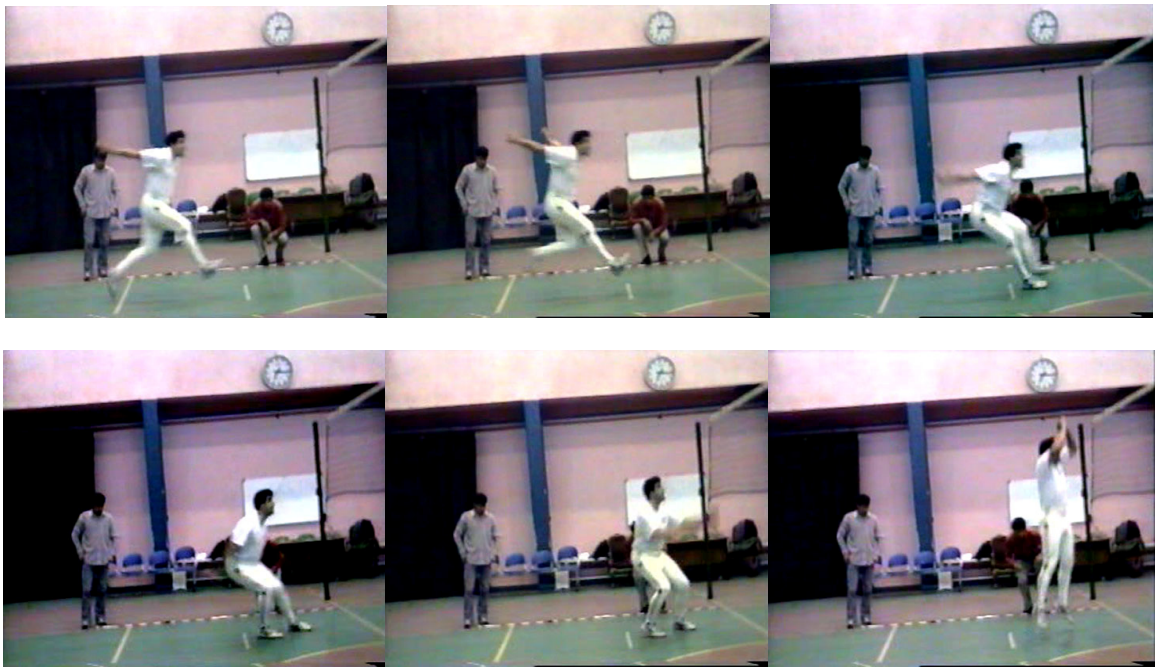

Figure 1 A long stride procedure is presented in the photos to show how it may help with better jump and landing in our pilot studies.

Theoretically, the CG (centre of gravity) of the players is displaced longer distance in long stride but with higher horizontal speed in order to achieve a higher jump than in short stride (Dusault 1986). On the other hand, in short stride the horizontal motion is minimal and vertical motion is maximal to achieve a high jump according to Prsala (1982); and Hudson (1986). Our findings did not support Dusault (1986) but somehow supported Prsala (1982); and Hudson (1986) suggestions but also showed that all depends on players' skills, abilities, and the way they had already got used to it. In Table 1, the Pearson correlations at the level of <0.05 for stance height and jump height is significant, while there were no correlation with players' mass. In Table 2, a weak correlation between short stride and normal and long jump heights are shown at the level of<0.05, while there where no correlations between normal

and long strides and different jumps. There where no correlations between different stride lengths and landing deviation and different jump height and landing deviation.

Table 1 Correlation between mass, stance height & different jump heights

Variable	Correlations	J.H. Short	J.H. Normal	J.H. Long
Stance Height	Pearson Correlation	-.565	-.650	-.618
	Sig. (2-tailed)	.035	.012	.019
Mass	Pearson Correlation	-.035	-.121	.190
	Sig. (2-tailed)	.905	.680	.515

Table 2 Correlation between stride types & different jump heights

Stride types	Correlations	J.H. Short	J.H. Normal	J.H. Long
Short Stride	Pearson Correlation	.257	.431	.432
	Sig. (2-tailed)	.376	.024	.023
Normal Stride	Pearson Correlation	.082	.297	.371
	Sig. (2-tailed)	.781	.303	.192
Long Stride	Pearson Correlation	.021	.249	.325
	Sig. (2-tailed)	.943	.392	.258

Table 3 Correlation between stride types & different landing deviation

Stride types	Correlations	D. Short	D. Normal	D. Long
Short Stride	Pearson Correlation	.151	-.075	.070
	Sig. (2-tailed)	.607	.800	.813
Normal Stride	Pearson Correlation	-.045	-.279	-.091
	Sig. (2-tailed)	.878	.335	.758
Long Stride	Pearson Correlation	.010	-.342	-.115
	Sig. (2-tailed)	.973	.231	.696

Table 4 Correlation between different landing deviation & same jump heights

Variables	Correlations	H. Short	H. Normal	H. Long
Deviation (Short)	Pearson Correlation	.151	.334	.158
	Sig. (2-tailed)	.607	.244	.591
Deviation (Normal)	Pearson Correlation	.097	.018	-.110
	Sig. (2-tailed)	.741	.950	.709
Deviation (Long)	Pearson Correlation	.109	.089	-.112
	Sig. (2-tailed)	.710	.762	.702

CONCLUSIONS:

The results of this study may provide practitioners with some important implications in regard to volleyball jumping and landing techniques. However, the data collected and the results should be interpreted with caution. Although the basic training and strategy of volleyball

playing, especially in approaching for offense do not vary greatly, individuals of lesser expertise, or those playing under different conditions may utilize different jumping and landing techniques. Designing practice routines and sequences that teach athletes to approach and land correctly seem important for volleyball coaching professionals. These results may provide physical educators with proper teaching sequences and cues when teaching volleyball units.

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