

DROP JUMPS OR HURDLE JUMPING FOR VOLLEYBALL TRAINING?

Jukka T. Viitäsalo¹ and Kirski Hamalainen²

ABSTRACT

1) Research Institute for Olympic Sports, Jyväskylä, Finland

2) Pajulahäti Sports Institute, Nastola, Finland.

Drop jumps and hurdle jumping are drills widely used in volleyball training. Selection of dropping height or hurdle jumping technique has often been based on traditions rather than detailed biomechanical analysis. This study was designed to compare volleyball spiking and blocking with the jumping drills mentioned above in relation to various kinematic and kinetic parameters and myoelectrical activity (EMG).

Ten volleyball players ranging in age from 20 to 26 years with an average volleyball playing and training background of eight years volunteered as subjects. After warming up the subjects performed with maximal effort a total of 60 spikes, blocks and various jumping drills with a 30 s interval between each separate activity. The spikes were step-close and hop spikes, and the blocks were performed with and without side steps. The drop jumps (DJ) were performed from heights of 0.25m, 0.45m, 0.65m and 0.85m. The hurdles (height 1.0m) were arranged so that the jumping was performed both with bilateral foot contacts with no steps between the hurdles and with one step between the hurdles. All take-offs and landings were performed on force platforms so that three-dimensional ground reaction forces as well as contact and flight times could be measured for each jump. An electrical goniometer was used to detect knee angle data and EMG activity was registered from the knee, hip and ankle extensor and knee flexor musculature using surface electrodes.

The block jumps showed the longest total contact times (337-589 ms) followed by the spikes and hurdle jumping (254-329 ms) and the drop jumps (212-225 ms). Average eccentric ground reaction forces increased with dropping height (from 3177 to 4194 N) and were higher than for the hurdle jumping (2115-3108 N), spike (2364-3005 N) or block jumps (1243-2279 N). During the eccentric phase of contact average knee angular velocity varied between 2.8 rad/s (block) and 5.3 rad/s (DJ45) and during the concentric phase of contact between 6.5 rad/s (block) and 9.1 rad/s (DJ45). Eccentric EMG activity in the drop jumps and hurdle jumping remained at the same level as in the spike jumps, while during the concentric phase, EMG activity in the hurdle jumping did not reach the levels measured during the spike, block and drop jumps.

It is concluded that the utilisation of dropping above 0.45 m leads to high eccentric forces, which compared to hurdle jumping or to jumps performed from lower drop heights appear to yield no additional benefit in volleyball training and may actually have injurious effects on players.