COMPARATIVE STUDIES ABOUT KINEMATICS OF MAXIMAL SPRINT RUNNING AND RUNNING UP IN HORSE VAULTING

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KEY WORDS: horse vaulting, running up velocity, kinematics.

INTRODUCTION: Effective running up is known as an important factor for successful completion of horse vaulting. Some examined the relationship of mechanical parameters of pre-flight and/or post-flight with gymnasts' performance. However, running up kinematics and its running velocity have been neglected. So the purposes of present study were 1) to compare the kinematics of running up during horse vaulting with that of sprint running, and 2) to investigated the relationships of running velocities and scores of horse vaulting.
METHOD: Nine male gymnasts, including medallists in Athens Olympic games participated in this study as subjects. They performed running up with their best performance in horse vaulting as usual games. After that, they ran on horse-vault runaway in their all effort, sprint running in short distance. Laser Doppler type velocity gauge measured running velocities during both running. They were videotaped using high-speed video cameras in sagital plane at 250fps and 1/500sec shutter speed. Kinematic parameters were obtained from digitizing 23 anatomical body landmarks.
RESULTS: Figure 1 represents difference at elbow joint angles during both running. Peak elbow joint angle during running up was significantly greater than that during sprinting. Figure 2 represents difference at shoulder joint angles during both running. Peak shoulder joint angle during running up was significantly smaller than that during sprinting. However, no significant difference was found in knee joint angle during running up and sprinting. Maximal velocity during both sprint running and running up were significantly correlated with scores ($r=0.74$ and $r=0.72$, $n=9$, $p<0.05$).

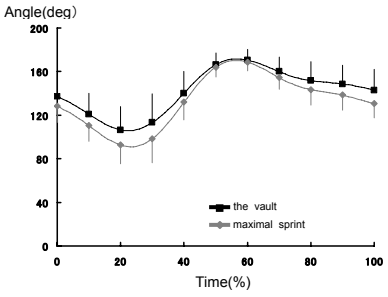

Figure 1 Elbow joint angle in the vault and maximal sprint

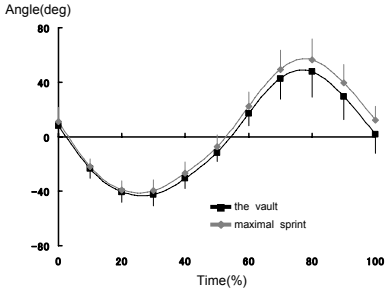

Figure 2 Shoulder joint angle in the vault and maximal sprint

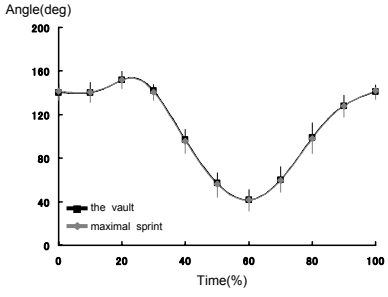

Figure 3 Knee joint angle in the vault and maximal sprint

DISCUSSION: From this study, the results indicated that gymnasts use different technique in the run up compared with sprinting. On the other hand, it was thought that the higher running up velocity enabled gymnasts to augment flight times when performing more difficult techniques. Moreover, the higher pre-flight velocity associated with sufficient landing distance (Kerwin et al., 1993). So, the higher running up velocity may also enable the higher pre-flight velocity. As a result it was thought that it is necessary to run as fast as possible to get higher scores in the horse vaulting.
CONCLUSION: Gymnasts perform a vaulting run up different from sprinting and higher running velocity is necessary for higher-scored movements.
REFERENCES:
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