

# THE BIOMECHANICS ANALYSIS OF THROWING TECHNIQUE

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**KEY WORDS:** throwing technique

**INTRODUCTION:** Throwing is a basic human movement. The overall performance object of sport involving throwing is to obtain a displacement as large as possible. The purpose of this study was to examine the overarm throwing technique of a small weight.

**METHODS:** Five physical education students were recruited as the subjects in this study. The average age of the five students was  $24.5 \pm 0.58$  years. Their best achievement of a standard weight of 1 kg was the above 65-meter. Four steps throwing method was employed in this study and this technique is similar to that used in javelin throwing. Panasonic AV\_DXI portable camera (frequency: 50 Hz; shutter speed: 1/600 second) was used to record the motion of throwing. Run-up velocity; step pattern in transition phase, step pattern in release phase and release velocity, release angle were the parameters in this study. These parameters have been used in the study of javelin throwing. Motion analysis system (Aijie, China) was used to analyze the parameters.

## RESULTS AND DISCUSSION:

1. Theoretically the faster the run-up phase, the longer the throw. Results showed that the run-up velocity of throwing was 45.99% of maximum speed. In order to improve the throwing performance, it was suggested that 70% of maximum velocity should be achieved.
2. Results of this study also showed that shortening the step length and cross step of transition phase reduced the run-up velocity which influencing the release velocity. Previous studies stated that during the transition phase, the thrower change the body form running to an efficient throwing position. Therefore, the decrease in the run-up velocity is required.
3. Before release the body should be fully extended before the last step in release phase. The "fully bow" posture is an efficient throwing position. It could improve the performance by increase the travel distance and the force acting on the weight during throwing.
4. The motion of the left leg after touching the ground in the last step of release phase was also evaluated in this study. The motion of left leg could provide shock absorption and spreading after the left leg touching the ground is the key in the efficacious whip motion. This study found that the largest left knee joint angle was  $140^{\circ}$ - $150^{\circ}$ . In theory, in order to improve the performance, it should be close to  $180^{\circ}$  when the weight releases from the thrower's hand.