

KINEMATICS COMPARISON OF TWO COMMON DIFFERENT GUARD IN TAEKWONDO AP DOLLIO CHAGI

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Tae Kwon Do is the art of using hands and feet to defend what is now modern sports world has become. The aim of this study was to procure characteristics of Kinematic of Ap Dollio Chagi techniques in two different guard: doing technique with front leg and back leg of guard. Nine elite Taekwondo athletes participate in experimental research. Results, showed that there were significant differences between two different guards in movement time, maximum velocity of toe, hip angular velocity, knee angular velocity, and ankle angular velocity. These kinematics characteristics of front guard were better than back guard, these reach significant difference statistically. It suggested that there was asymmetry guard in the Taekwondo elite athletes during Ap Dollio Chagi kick.

KEY WORDS: Taekwondo, Ap Dollio Chagi, Kinematics, Elite athletes

INTRODUCTION: Taekwondo was a demonstration sport in 1988 and 1992 Olympics before becoming an official sport in 2000 Olympics. Speed and hitting target (accuracy) are the important factors to get points in Taekwondo. There are two frequent different guards in Taekwondo which concerned for the sport medicine researchers. In previous study, the comparison between these two different guards was investigated to exam the asymmetry in strength and flexibility in soccer players (Arshi & Behdad, 2006). Taekwondo is also a kicking sport, which kicks the opponent by preferred leg or both legs alternately. However, It is not known whether this preference existed in the elite Taekwondo athletes. Generally, the athletes favor one particular foot for kicking the target during training.

In modern Taekwondo, athletes use both of guard's leg in accordance with a condition, during the competitions. Ap Dollio Chagi use commonly with front and back leg of guard. Albeit the specific techniques used, but discrepancies in the kinematics of Guard are ambiguous, yet.

The Ap Dollio Chagi divided to four phases and five state: first, when the heel off from ground. Second, when the knee angle is minimum. Third, when the knee angle is maximum and the greatest height from the ground. Fourth, when the knee angle experience it's second minimum value. Fifth, when the heel contact the ground again.

The main goal of this study was to kinematics analyze of two different guards in Roundhouse kick (Ap Dollio Chagi kick). Athletes and coaches can use these results to ameliorate general performances.

METHODS:

Nine elite athletes of National Taekwondo Team of Iran who won many medals of Taekwondo games at international level participate in this experimental research. We chose the Ap Dollio Chagi in two different guards being testing movement, which is the most frequently, used technique in competitions. A Motion Analysis System with six high speed cameras (Vicon, oxford metrics, UK) was used to collect the kinematics data (sampling rate at 200 Hz) through tracking the thirty-two reflective makers, relative angular velocity for each lower limb was derived from the time series in two guards.

Protocol: after static trial, following 10 min of self-administered warm up and 5 min of self strength. Each participant performed five repetitions of the Ap Dollio Chagi with front and back leg of guard.

RESULTS: The linear velocity of markers showed on Figure 1. It illustrate that there were significant differences between two different guards (Back Guard (BG) and Front Guard

(FG)) in movement time, maximum velocity of toe, hip angular velocity, knee angular velocity, and ankle angular velocity.

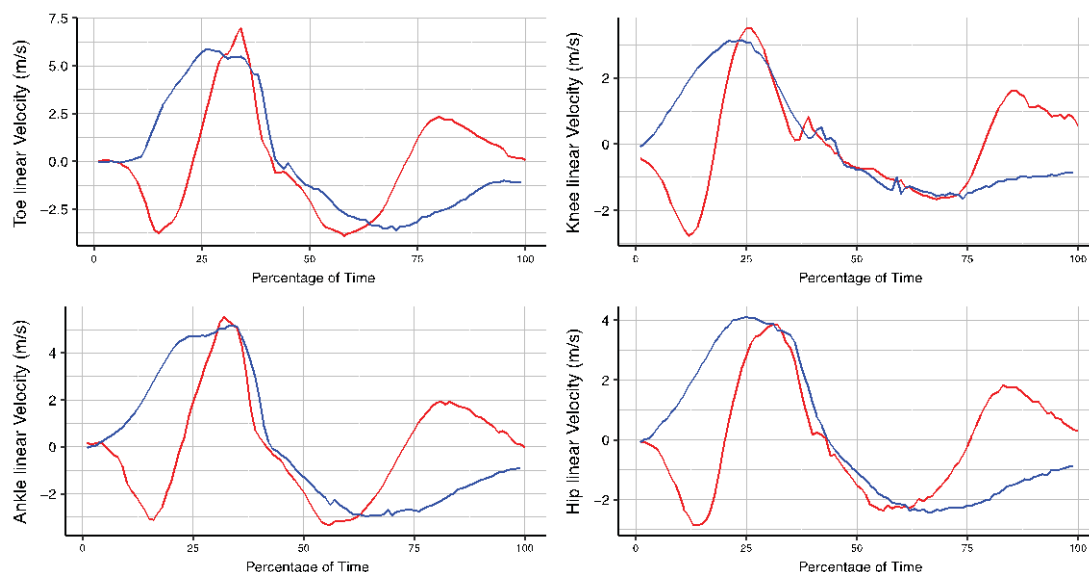


Figure 1: Linear velocity of lower limb marker in two different guards (red line represents BG and blue line shows FG)

DISCUSSION:

In back guard (BG) kick, athletes have negative initial velocity because they move trunk to the front for increasing their stability in the ground. In the front guard (FG), athletes do not need the initial trunk velocity, because FG has more stability intrinsically. It can be seen, increasing velocity in the end of BG for return to the previous position guard and increasing the stability. On the other hand, FG needs less time for performing the technique.

The relationship between the linear velocity and angular velocity is $V = R\omega$, where V is the linear velocity, ω is the angular velocity and R is the radius. The greater radius (in the same angular velocity) is more linear velocity. Therefore, toe marker in difference with knee has higher linear velocity and other markers are similar. Although these kinematics characteristics of FG were better than BG, these reach significant difference statistically. It suggested that there is asymmetry guard in the Taekwondo elite athletes during Ap Dollio Chagi kick.

CONCLUSION: Based on these findings, the Taekwondo elite athletes have kinematical difference between two different guards (BG & FG) during (Ap Dollio Chagi) Ap Dollio Chagi kick in Taekwondo. It suggested that the symmetric kicking guard skills are important to elite level for Taekwondo, which may be an advantage in attacking and avoided the prediction from opponents in games (Piester 1995). Also, athletic for unstable and the clash situation use the BG, because this guard provides stability and power with changing the lower limb kinematics. On the other hand, FG is agile guard and athletes can performs technique and tactics quickly.

REFERENCES:

- A. Arshi, Bahad, inspired Sherzad (1384). Kinetics and kinematics up Douliou areas of Chagai Taekwondo techniques. Department of Biomedical Engineering, University of Technology, the twelfth Conference of Medical Engineering.
- Pieter, F. and Pieter, W. (1995). Speed and force in selected taekwondo techniques. *Biology of Sport*. Vol. 12, No. 4, pp 257-266.

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