Tae Kwon Do vs. Karate – Biomechanical Characteristics

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Introduction

Quantitative motion analysis study into the characteristics of martial arts has been overlooked. Hence, there is a need to gain such knowledge. On the other hand, some skeptics feel that serious injury may be more likely to occur in martial arts practice than by being hit on the head by a mugger (Sports Injury Bulletin, 2006). One study (Pieter & Taaffe, 1992) found that male college Tae Kwon Do athletes had an injury rate just below that of American Football participants in college. The inherent wisdom uncovered by quantitative analysis of martial art techniques is significant. Such analysis by way of advanced technology will aid coaches in both skill improvement and injury prevention.

Objective

The goals of this proposed research are:

1. To supply 3D kinematic characteristics of advanced practitioners.
2. To quantify weight transfer patterns of the various techniques during performance
3. To disclose the muscle control and the possible control pattern of advanced players

Setting

University of Lethbridge, Biomechanics Lab.

Subjects

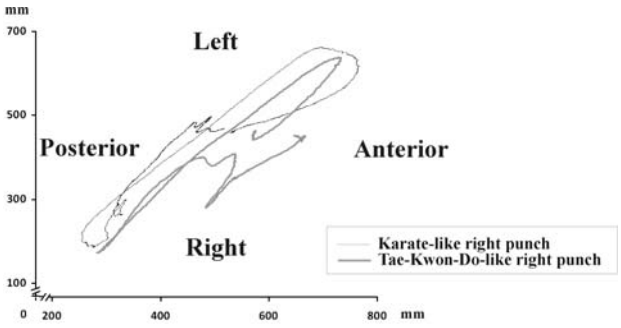
This study involved 15 participants from Lethbridge area (aging from 20 – 28 years old).

Intervention/Main Outcome Measures

From motion capture, we can obtain anatomical positions that allow the modeling of the skeletal structure, which enables the reconstruction of human body and the calculation of joints' ROMs (range of motion) and dynamic COG (center of gravity). With the help of EMG measurement synchronized to motion capture, the 3D kinematic characteristics, weight transfer patterns and neural muscle control will be revealed.

Main Results

The full body kinematics reveal: 1) trunk and hip rotation (twist) plays an import role in increasing the hand punching velocity / momentum; 2) the weight transfer (figure below) shows that karate punch is more stable in medial-lateral direction than Tae-Kwon-Do punch; 3) hip rotation contribute significantly to the quality of kick movement; and 4) the timing of joint coordination (e.g. the timely coordination among hip, trunk, shoulder, elbow and wrist in punching movement) is a key factor for determining athlete performance level.



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