

BIOMECHANICAL ANALYSIS OF HOLD-THROW TECHNIQUE IN ELITE WRESTLER

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INTRODUCTION: Good skills in wrestling are one of the keys to success. An experienced wrestler can win the game by strength and dexterity. However, of these qualities, the strength factor is the basic one, in order for wrestlers to master wrestling techniques and develop their skill. Therefore, the combination of good techniques and strength is the necessary requirement for winning. Kinematic testing can provide the features of wrestling techniques and the strength features can be obtained by using isokinetic dynamometer system. Through above method. With a better understanding of the biomechanical features in wrestling techniques, it is possible to diagnose and evaluate the performance of the wrestler and to provide suggestions for development of skills in training and for competition.

METHODS: Fifteen elite wrestlers were recruited as subjects in this study. Three video recorders operating at 50fps (exposure time 1/1000 s) were set symmetrically to record the wrestler's hold-throw techniques. Aijie Video analyses system was employed to digitize the video records, and to obtain kinematic parameters of subjects' movement. DLT method was used to reconstruct the 3-D space from 2-D image. All digitized coordinates were digitally filtered using a low-pass digital filter with a 10HZ cutoff.

Shoulder, elbow, knee and hip joint of subjects were tested for isokinetic torque using MERAC isokinetic testing (Universal Company, USA) and analyses system. Low, 60 degree/second, and high testing velocity, 240 degree/second, were employed in this study. When the subject was tested using 60 degree/second, the wrestler was asked to perform flexion and extension of their specific joint 6 times, consecutively. When testing using 240 degree/second, 20 times was required.

RESULTS: The distance between the center of gravity of opponent and defender was calculated. From the data it can be shown that the more experienced opponent can keep his CG changing with the defender's at the same time, maintaining the least distance. However, less experienced wrestlers show the contrary. There are two types of movement in knee and hip joint of all wrestlers. The curve of knee and hip joint angle of top level wrestlers is smooth and synchronized. The same curves of less experienced athletes have many fluctuations. Moreover, the range of fluctuation is large. The extension isokinetic peak torque (isokinetic peak torque/weight of wrestler) of shoulder and elbow are larger than flexion. The same result can be found on hip and knee joints. The isokinetic peak torque of high testing speed of both upper limb and lower limb are larger than that of low testing speed. The isokinetic peak torque of subjects is higher than most others reported. The torque ratio of extension and flexion of upper limb is 64% - 92% and lower limb is 49% - 57%.

CONCLUSION: The relationship and change of the center of gravity of two wrestlers provides evaluation of the whole movement. The movements of lower limb can demonstrate the effectiveness of wrestler's techniques. Wrestlers of Beijing team have good strength ability. As far as isokinetic peak torque and torque ratio of extension and flexion concerned, these athletes have good wrestling characteristics.