A METHOD TO DIAGNOSIS THE KINETIC CHARACTERISTIC OF THE STRAIGHT KICK PERFORMANCES

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INTRODUCTION

Just like the Round Kick[1], the Straight Kick (SK) is another attack method to get score in Chinese Wushu competition. In order to get high effect, the key factor in SK performance is to reach the kick force as large as possible in a short period of time.

However, up to now few have been published related to the kinetic characteristic of this performance. Maybe it was related to the difficulty to test the horizontal kinetic variables of SK by using the force platform directly. Then T-Y Shiang, et al.[2] gave an idea. In order to get the impact data of the baseball, they mounted the force plat vertically on the wall, which makes it possible to test the kinetic characteristic. Therefore, the purpose of this paper is to try to develop a method used to diagnosis the kinetic characteristic of SK performances of China elate Wushu athletes and to present some references for the further research in this area.

METHODS

Participate: 8 Chinese elate Wushu athletes with (age, height, weight) 22.32±0.45year, 1.76±0.03m、72.65±6.62kg.

Apparatus: just as Fig. 1, the metal frame was fixed on the

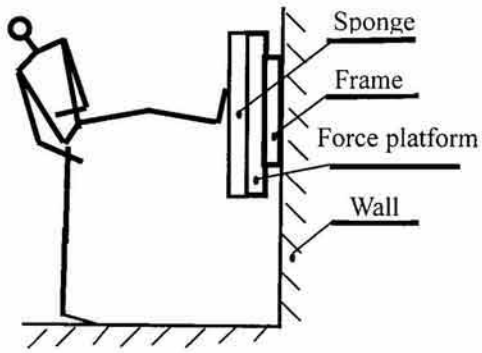

Fig. 1 The experimental apparatus setup

wall. Then the Kistler force platform (9287B) was fixed on the frame. In order to minimize the sore of the foot, a sponge was fixed on the platform with an adhesive tape.

Procedures: in order to avoid injury, every subject was required to warm up more than 5 minutes including running and stretching the tendons. At hearing the start instruction, the athlete moved one step forward to the force platform with One leg standing on the ground, and the other straight kicking horizontally onto the platform with the maximum force.

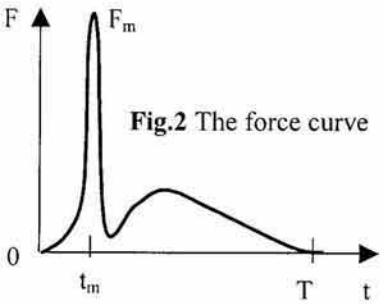

Fig.2 The force curve

Fig.2 is the typical force curve. At beginning, the force is zero. After a short time t_m, the force reaches the top F_m. At time T, the force gets down to zero. $\Delta F/\Delta t$ was calculated by the function F_m/t_m, which was the average force gradient within the time from the contact to the maximum force. Because of the explosive style of the performance, the force data were sampled at 2000Hz for 5s duration.

In the experiment, every athlete was required to complete three trials with the right foot and then with the left foot respectively. The Preferred Leg (PL) was defined in this paper to be the leg with the larger maximum kick force, and the non-Preferred Leg (non-PL) was to be with the less force. The best one of three trials in PL and non-PL respectively was selected as the statistics sample.

Statistics: T-test was used to determine the differences between kinetic variables of PL and non-PL with significant level at 0.05, and 0.01.

RESULTS AND DISCUSSION

From the contact to the maximum force, the time was about 20ms. The total time from contact to separate is about 170ms. In the aspect of time t_m and T, there was no significant difference ($p>0.05$) between the PL and non-PL.

In the maximum force, however, the force of PL was significant larger ($p<0.01$) than that of non-PL. The PL had maximum force 925.51±122.48kgf, while the non-PL was 35.6% lower. The maximum force was about 12 times of Body Weight, which is much larger than the maximum force of vertical jump[3].

Table 1 the kinetic variables of the athletes (n=8)

Variables	PL(M±SD)	Non-PL(M±SD)
t_m(ms)	20±3	21±2
T(ms)	170±21	170±35
F_m(kgf)	925.51±122.48**	595.66±104.44
$\Delta F/\Delta t$ (kgf/s)×10^3	46.17±9.12**	29.61±6.39
Impact (kgfs)	19.24±5.49*	13.40±5.1

Note. * Significant different ($p<.05$); **highly significant different($p<.01$)

In aspect of force gradient, the difference between LP and non-LP was highly significant ($p<0.01$). The $\Delta F/\Delta t$ of LP is (46.17±9.12)*1000kgf/s, while that of non-LP was 35.7% lower. In the impact, there is still significant difference between the LP and non-LP ($p<0.05$). The Impact of LP is about 19.24kgs, while the non-LP was only about 13.40kgs with 30.4% lower.

REFERENCES

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