

# ON THE ORDER, TIME PROCEDURE AND TIME DIFFERENCE OF MUSCLE'S STRENGTH WHEN DOING SWING PARTS AFTER HANGING ON FLYING RINGS

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## INTRODUCTION

How is the magnification of the lower back muscles and lower muscles exerting force during back and whip swing from hanging position in rings? How is the effect of these muscles on the movement? The study about the problem has not been found up to now in home and abroad. In this study, we selected five typical movements of back and whip swing in rings and revealed the four muscles acting mainly on the back and whip swing in rings.

## METHOD

The High-speed cameras (Model: LBS-16A, speed: 100 framers per second), Pulling-force sensor (Model:HYL-1) and Remoto EMG meter (Model: Multi Telemeter 551, Japan made) were simultaneously operated by means of Synchronous Signal Generator. EMG signal from four muscle groups was directly sent into micro-computer (Apple II) to process, and signals of EMG and pulling-force sensor were also recorded by Multi Telemeter. The data of camera was processed by Film Analyzer (Model: NAC MOVIAS 100).

## RESULT

Table 1 showed that order of muscles exerting are from muscles of waist and back to triceps of lower leg or from hip joint to ankle joint.

Table 1:Order of mucle's exerting

	Giant swing forward	Stemme backward headstand	Inlocate	Back up	Hanging swing
Muscles of waist and back	1	1	1	1	1
Greatest gluteal	2	2	2	2	2
Biceps of thigh	3	3	3	3	3
Triceps of lower leg	4	4	4	4	4

Table 2: Time of muscles exerting(ms)

		Giant swing forward	Stemme backward headstand	Inlocate	Back up	Hanging swing
muscles of waist and back	x	202.6	208.2	239.0	195.5	194.0
	s	3.0	6.9	10.8	5.0	3.8
Greatest gluteal	x	170.6	172.6	198.6	167.3	166.2
	s	6.7	6.1	9.2	7.3	6.0
Biceps of thigh	x	166.6	167.3	186.7	162.5	160.4
	s	5.4	7.2	7.9	6.3	8.7
Triceps of lower leg	x	137.6	138.2	147.7	124.1	123.2
	s	2.1	3.1	5.7	4.3	4.2

Table 3: Kinematic parameters of musclecontraction from beginning to ending(m/s)

Giant swing forward	Velocity of gravity	4.1+/-0.3	0.1+/-0.1
	Velocity of hip joint	4.4+/-0.2	1.6+/-0.1
	Velocity of ankle joint	7.3+/-0.4	14.2+/-0.6
Stemme backward headstand	Velocity of gravity	3.05+/-0.1	0.9+/-0.1
	Velocity of hip joint	3.2+/-0.3	1.5+/-0.2
	Velocity of ankle joint	6.6+/-0.4	13.5+/-0.5
Inlocate	Velocity of gravity	3.3+/-0.2	1.8+/-0.2
	Velocity of hip joint	3.7+/-0.5	2.0+/-0.3
	Velocity of ankle joint	6.9+/-0.4	13.5+/-0.6
Back up	Velocity of gravity	2.9+/-0.2	1.0+/-0.1
	Velocity of hip joint	3.1+/-0.3	1.4+/-0.2
	Velocity of ankle joint	6.4+/-0.4	12.9+/-0.5
Hanging swing	Velocity of gravity	2.7+/-0.2	1.2+/-0.1
	Velocity of hip joint	3.0+/-0.3	1.3+/-0.1
	Velocity of ankle joint	6.2+/-0.3	12.3+/-0.5

Table 2 showed that time of muscles exerting are from contraction of muscles exerting to ending. Muscles of waist and back are longest in muscle contraction time. They are related to their origin insertion and function. Time difference of muscles exerting are positive value among measuring these movements.

Table 3 showed that average velocity of all ankle joint are increased from 6.2-7.3m/s to 12.13-14.3m/s, but average velocity of all hip joint are decreased from 3.01-4.40m/s to 1.29-1.55m/s.

### **CONCLUSION**

Order of muscles exerting are from near end to far end in turn, wheher these movements are difficult or not. They are succesively muscles of waist and back greatest gluteal biceps of thigh and triceps of lower leg. In time of muscles of exerting muscles of waist and back are longest and greatset gluteal biceps of thigh triceps of lower leg are decreased progressively. Time difference values of muscles exerting is longest from muscles of waist and back to greatest gluteal first, from biceps of thigh to triceps of lower leg next. Time difference values of muscles exerting are shortest from greatest gluteal to biceps of thigh. So it is important that these muscles should exercise for the athletes.

### **REFERENCE**

Niu jianzhuang (1992). Sports mathematics and system engineering.