BIOMECHANICAL KINETIC ANALYSIS OF SERVE TECHNIQUES IN TABLE TENNIS FOR ELITE WOMEN PLAYER YINING ZHANG

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INTRODUCTION: According to the biomechanical analysis of serve techniques to Yining Zhang ,who is the number one player of the world women's table tennis ranking 2007, we hope that it can enrich theories of table tennis skills, as well as providing some reference to the table tennis training.

METHOD: In the final of Women's World Cup table tennis 2007 between Yining Zhang and Nan Wang , we set a high-speed video camera (Baslen Asbozfc, shooting frequency is 200 frame/sec) at the front of Zhang to film her serve techniques and other two JVC video camera (shooting frequency is 50 frame/sec) at her right side to finish a spotted 3-D film.The angle of these two video cameras' main light-axis is 100°.The high-speed video camera filming mainly is used for analyzing the rotation speed of table tennis.The video which the two JVC video cameras shot is used 3-D-SignalTEC v10c analysis system to analyze serve techniques. All digitized coordinates are filtered using a low-pass digital filter with a 8 Hz cutoff.

RESULTS AND CONCLUSION: According to the analysis to data of Yining zhang's serves technique video, we conclude that:

1. The velocity of serves 'right shoulder、elbow and wrist are displayed in Table 1. No matter whether serving a long shot or a drop shot all techniques conform to the theory of whipping in biomechanics. The speed of shoulder, elbow and wrist increase gradually. There is no remarkable diversity between long and drop shot from table one, which represents that concealment of Zhang's serve is good and rivals can hardly judge her serves.

Table1 the velocity of serves 'right shoulder、elbow and wrist (m/s) (m/s).

	Long shot （N=4）	Drop Shot （N=5）
Shoulder Joint	2.62	2.42
Elbow Joint	3.25	3.39
Wrist Joint	3.81	3.83

2. When Zhang serves long shot and drop shot, the velocity of racket which the racket hits the ball respectively is 4.30 m/s and 4.26 m/s and the velocity of ball which the ball parts from the racket respectively is 4.98 m/s and 4.76 m/s . The velocity of long shot is a little faster than the drop shot one, but there is no significant difference (P>0.05). Based on velocity of arm, elbow and wrist in long and short serve, we conclude that Zhang's long shot is not powerful enough.

3. Rotation speed of under spin serve of the first three players of World Cup 2007, Nan Wang, Yining Zhang and YueGuo (Table 2). Compared to the other two players, rotation of Yining Zhang is lowest and needed to be improved.

Table 2 NanWang, Yining Zhang, YueGuo rotation speed of under spin serve (r/s) *

	Long Shot			Drop Shot		
	S1	S2	S3	S1	S2	S3
NanWang	33	29	28	40	33	33
Yining Zhang		29	28	30	25	20
YueGuo	36	36	33	33	31	31

Note: The rotation the fastest time of three player; S1:the rotation speed of table tennis parts from the racket; S2：the rotation speed of table tennis hit the own side table; S3：the rotation speed of table tennis hits the other side table