THE EFFECTS OF STRIDE LENGTHS ON ACCURACY AND NON-ACCURACY THROWING PARAMETERS IN TEAM HANDBALL

[1]Emel Çetin, [2]Gülşah Şahin
[1,2]Akdeniz University School of Physical Education and Sports
email: emelcetin@akdeniz.edu.tr

INTRODUCTION

Throwing accuracy and throwing velocity in handball are regarded as basic parameters of performance during competition. Several investigator have studied the relationship between the velocity of movement of the upper limb and accuracy in hitting target [1,2] and throwing on the spot or jump shot performance in handball [3]. The aim of the present study was to determine the effects of last three stride lengths on accuracy and non-accuracy throwing performance.

METHODS

Two groups of subjects took part in the experiments: One group of 9 handball players, Turkish Handball National Team (age 25.44±3.28 yrs), another group of 9 handball players, the best League A3 (age 22.66±1.58 yrs). All throws were recorded by two high speed camera (100 Hz) and used HUBAG (http://www.biomech.hacettepe.edu.tr/hubag) motion analysis system to acquire kinematics data. After a general warming up of 15 minutes, throwing performance was tested in an over arm throw towards a target at 6m distance. The subjects performed a standing throw with keeping the front foot on the floor after three strides. The subjects threw two times. The instruction was to throw as fast as possible aiming at a target of a 60x60 cm positioned in a handball goal. Throws, which is placed inner side of target, are recorded as accurate. Pearson correlation ($p<.05$) was used to examine the relationship and student-t test were used to compare differences between stride lengths and throwing parameters.

RESULT AND DISCUSSION

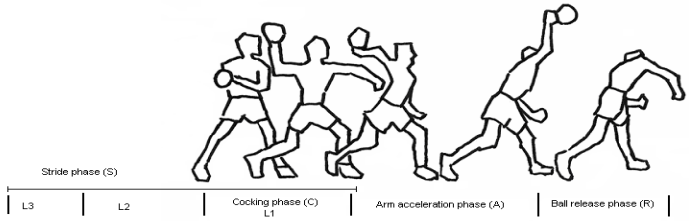

Figure 1.Last three stride phases (L_1: last stride length, L_2: second last stride length, L_3: third last stride length)

Total 36 handball throwing (Group I: 11 accuracy throwing, 7 non-accuracy throwing; Group II: 6 accuracy throwing, 12 non-accuracy throwing) performances were recorded. The identify of stride lengths were presented in Figure 1. There were significant differences between ball velocity and stride lengths among in accuracy over arm throwing (See Table 1).

Table 1. Values of stride length and ball velocity in Group I and Group II

	Accuracy throwing		
	Group I (n=11)	Group II (n=6)	p
	mean± SD	mean± SD	
L_3(% height) (cm)	37.43±8.83	43.66±7.01	.096*
Ball velocity (m/sec)	16.45±5.78	23.54±6.74	.015*

The relationship between the last three stride lengths and some throwing parameters were showed that Table 2. (C: cocking phase, A: acceleration phase, R: ball release phase)

CONCLUSION

Stride length parameters are effective on over arm throwing parameters. There was a positive relationship between L_3(% height) and elbow flexion angle at accuracy throwing and upper trunk angular velocity in arm cocking phase at non-accuracy throwing. The trunk movement may play a role through transfer of angular momentum which should be indicated by any relationship between throwing speed and trunk movement parameters [4]. Both ball velocity and upper trunk angular velocity in cocking phase were found bigger at Group II than Group I. But, when the ball velocity increases, accuracy is decreased [4]. In this study, Group II performed faster ball velocity and less accuracy throwing. In accuracy throwing, between last stride length and shoulder internal rotation angle in acceleration phase was found negative relationship.

REFERENCES

1. Bayious I. Accuracy and throwing velocity in handball, Greece, ISBS, Congress Proceedings, Abstract,1998

2. Tillaar R., Ettema G. A three-dimensional analysis of overarm throwing in experienced handball players, *Journal of Applied Biomechanics*, 23:12-19, 2007

3. Pori P., Sibila M. Basic kinematic differences in arm activity between two types of jump techniques in handball, *Kinesiologia Slovenica*, 9:2, 58-66, 2003

4. Tillaar R., Ettema G. Influence of instruction on velocity and accuracy of overarm throwing, *Percept of Skills*, 96(2):423-34, 2003

Table 2. The relationship between the last three stride lengths and throwing parameters

Parameters			Accuracy throwing		Non-accuracy throwing	
			p	r	p	r
L_1 (cm)	Elbow flexion angle (°)	(C)			.049	.458*
	Pelvis angular velocity (°/s)	(C)			.019	-.532*
L_1(% height) (cm)	Shoulder internal rotation angle (°)	(A)	.043	-.496*		
L_2 (% height) (cm)	Ball release height (cm)	(R)			.024	-.514*
L_3 (% height) (cm)	Elbow flexion angle (°)	(C)	.049	.484*		
	Upper trunk angular velocity (°/s)	(C)			.011	-.567*
	Elbow flexion angular velocity (°/s)	(A)			.029	-.501*