

Improving Shooting Accuracy and center of gravity with closed kinematic chain exercises in handball players

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OBJECTIVES

Aim of the study was to examine the effectiveness of a training program consisting of closed kinematic chain exercises on shooting accuracy and jumping (center of gravity increase) in handball players.

METHODS

The study consisted of 20 non-randomly selected athletes. There were 12 participants in the study group and 8 in the control group. The study used shoulder and ankle active range of motion measurements (ROM), Davis Test (DT) to measure shoulder stability, Y-Balance Test (YBT) to measure dynamic balance ability, as well as center of gravity increase and shooting accuracy measurements. For statistical calculations Microsoft Office Excel software was used, results were considered significant at  $p<0.05$ .

RESULTS

A significant difference in shooting accuracy ( $40.79\pm24.38$ ,  $p<0.01$ ) was observed in the study group because of the exercise program, with no significant difference in the jumping ability ( $45.35\pm9.11$ ,  $p=0.22$ ). (Table 1.)

When measuring the active ROM of the shoulder and ankle, a significant difference ( $39.42\pm7.87$ ,  $p<0.01$ ) was found in the plantarflexion ROM of the left leg. (Table 2.)

Significant differences were found in the YBT scores for the left ankle when touching forward ( $97.17\pm7.68$ ,  $p=0.02$ ) and to the side ( $99.29\pm11.30$ ,  $p=0.04$ ) and for the right ankle when touching to the side ( $97.63\pm10.04$ ,  $p=0.04$ ). (Table 3.)

Statistically significant correlation of moderate strength ( $r=0.68$ ) was obtained in the correlation test of the dynamic stability (YBT) and the jumping ability. (Table 4.)

CONCLUSIONS

Closed kinematic chain exercises have been shown to be effective in improving shooting accuracy in youth handball players, but not in jumping ability. The strongest correlations were obtained when comparing ankle range of motion and dynamic stability measurements with the jumping ability, suggesting that there is a strong relationship between these parameters.

	STUDY GROUP		P
	PRE	POST	
SHOOTING ACCURACY	24.75±16.99	56.83±19.81	<0.01*
SARGENT JUMP TEST	44.71±10.25	46±8.22	0.224

Table 1.  
Statistical analysis of shooting accuracy and Sargent jump test correlating pre and post measurement results in the study group  
\*Statistically significant difference

Y BALANCE TEST	STUDY GROUP		P
	PRE	POST	
RIGHT POSTEROMEDIAL REACH	100.25±9.63	95±10.15	0.042*
LEFT ANTERIOR REACH	100.8±7.84	94.25±6.58	0.026*
LEFT POSTEROMEDIAL REACH	101.83±9.24	96.75±12.95	0.048*

Table 3.  
Statistical analysis of the Y Balance Test correlating pre and post measurement results in the study group  
\*Statistically significant difference

ANKLE ROM	STUDY GROUP		P
	PRE	POST	
RIGHT PLANTARFLEXION	37±7.19	40±7.43	0.180
LEFT PLANTARFLEXION	35.5±7.17	43.33±6.68	<0.01*
RIGHT DORSIFLEXION	16.92±4.03	18.33±6.02	0.118
LEFT DORSIFLEXION	17.25±4.58	18.83±5.62	0.113

Table 2.  
Statistical analysis of the ankle ROM correlating pre and post measurement results in the study group  
\*Statistically significant difference

		SARGENT JUMP TEST
Y BALANCE TEST	LEFT ANTERIOR	r=0,16
	LEFT POSTEROMEDIAL	r=0,54*
	LEFT POSTEROLATERAL	r=0,68*
	RIGHT ANTERIOR	r=0,52*
	RIGHT POSTERIOMEDIAL	r=0,68*
	RIGHT POSTEROLATERAL	r=0,49*

Table 4.  
Correlation statistics between the sargent jump test and the Y Balance Test  
\*Statistically significant correlation



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CO  
191

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