World Journal of Sport Sciences 3 (S): 186-189, 2010
ISSN 2078-4724

Effect of Ballistic Speed Strength Training on Shooting in Egyptian National Giants' Handball Team Players

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Abstract: The current research aims at designing a ballistic training program for developing speed strength and to identify its effect on improving the shooting skill of junior handball players. The researchers used the quasi-experimental approach with one-group design and pre-/post- measurement. Sample was purposefully chosen from the National Project for Giants' Players (under 18 years) - Middle Delta Area, 2009/2010 season. Sample was chosen from 13/2/2009 to 10/4/2009. Sample included 30 players. Results indicate that the ballistic training program had a positive effect on developing physical variables of the sample. This, in turn, increased the improvement percentage between the pre- and post- tests from 1.6% to 20.31%. The program, also, improved the skills variables from 30.89% to 36.89%.

Key words: Speed Strength · Ballistic Training · The Giants and Gifted Team

INTRODUCTION

Preparing the player physically for the sports activity demands is one of the major responsibilities of the training process that leads the progress of the player's training status to reach higher levels in the performed sport. Literature review indicated that muscular ability, speed and endurance speed are the special physical fitness components relevant to handball [1-3].

The researchers think that producing power in various game situations is one of the most important physical demands in handball. This is especially clear in shooting as high-level players are characterized by their quickness in performing motor tasks, compared to low-level players. Scientific references indicated that special preparation in handball should be directed to developing major skills and on the same path of motor skills [2]. The researchers think that developing special physical needs of the performed activity should be done through training methods suitable for the specific activity. Ballistic training helps stimulating and activating muscles and adaptation of neuro-muscular work through moving with max velocity and acceleration with higher launch rates and short contraction times. All this affects the agonist, antagonist and helper muscle groups [4].

Shooting is a major skill in handball. It depends on producing maximum power accurately as it depends on throwing. Throwing depends greatly on muscular power. If the launch angle is fixed, the distance covered by the ballista depends directly on final velocity (launching velocity). The main goal of the launcher is to provide the ballista with the possible maximum speed. To achieve this, maximum power and maximum velocity should be applied, along with elongating the acceleration distance. If the application distance is fixed, the power quantum and velocity are the base for a successful shot [5].

As handball coaches, the researchers found out that shooting is the major skill that players depend on during matches. Ballistic training has a positive effect on shooting. This is also clear from the previous studies [6-8].

The current research aims at designing a ballistic training program, including speed strength exercises, along with identifying its effect on improving the shooting skill of junior handball players.

The researchers hypothesized statistically significant differences between pre- and post- tests, in favor of the post- tests, on all physical and skills variables under investigation.

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MATERIALS AND METHODS

Approach: The researchers used the quasi-experimental approach with one-group design and pre-/post-measurement.

Sample: Sample was purposefully chosen from the National Project for Giants' Players (under 18 years),Middle Delta Area, 2009/2010 season. Sample was chosen from 13/2/2009 to 10/4/2009. Sample included (30) players.

Tools and Tests: For measuring the researchers variable the researchers used the following tools: a restameter - electronic medical balance - stop-watch - hand balls - medical balls - thigh dynamometer - fist dynamometer - cones.

For measuring physical variables, the researchers used the following tests: 30m run for measuring speed (second) [3] - throwing the ball with hand, wide jump from stance, vertical jump from stance, triple jump with ascent foot, triple jump with both feet and throwing a medical ball tests for measuring muscular ability (cm) [3] - bending trunk forward and downward test for measuring motor range (cm) [3] -10m zigzag run test for measuring ability to change directions (second) [3] - sit-up in 30 seconds and right and left fist strength tests for measuring muscular strength [9].

For measuring skills under investigation, the researchers used the following tests: shooting 10 balls - 5 jump shots after dribbling - 5 jump shots after pass and receive - 5 jump shots after deceive (point) [2].

The Recommended Training Program: The recommended training program aimed at improving the shooting skill through developing speed strength. High intensity interval training method was used. The program was divided into 8 weeks. Ballistic resistance ranged between 30% and 50% of maximum load. Performance was at maximum speed during 5:10 seconds. Training volume was 3 units per week (unit duration between 75:100 minutes). Total volume of the program was (90minutes x 3 units x 8 weeks = 2160 minutes). 40% of training volume was dedicated to physical training. Thus, training volume for physical aspects was (40minutes x 3 units x 8 weeks = 960 minutes). 40% of this volume was dedicated for speed strength (960 x 40% = 384 minutes). Rest intervals were 5 times work intervals. Warm-up and cool down were isolated. This minimized the total unit duration to 20 minutes. The recommended program included high speed exercises for all working muscle groups. The pre- and post- tests and main application of the recommended program were done from 13/2/2009 to 10/4/2009.

Statistical Treatments: The following statistical treatments are used: means - median - SD - Squewness - Correlation coefficient (R) - (t) test - improvement Percentage.

RESULTS AND DISCUSSION

Table 1: shows sample description on all research variables. It is clear that Squewness value was between 3±, indicating that the sample is free of radical distributions.

Table 2 showed that (t) value for pre-tests ranged from 4.37 to 215.69 for 30m run and wide jump from stance consecutively, while its value for post-tests ranged from 4.21 to 222.38 for 30m run and wide jump from stance consecutively. (t) Table value on $p \leq 0.05 = 1.69$. This is under its calculated value shown in Table 2. It is clear also that means differences are in favor of the post-tests. Improvement percentage between pre- and post-tests ranged from 1.6% to 20.31% for 10m zigzag run and bending trunk forward and downward consecutively. Improvement percentage was in favor of the post-tests.

Table 3 showed that (t) value for pre-tests ranged from 4.49 to 7.63 for 5 jump shots after passing and receiving and 10 shots tests consecutively, while its value for post-tests ranged from 6.39 to 10.02 for 5 jump shots after passing and receiving and 10 shots tests consecutively. (t) Table value on $p \leq 0.05 = 1.69$. This is under its calculated value shown in Table 3. It is clear also that means differences are in favor of the post-tests. Improvement percentage between pre- and post-tests ranged from 30.89% to 36.08 for 5 jump shots after deceive and 5 jump shots after passing and receiving consecutively. Improvement percentage was in favor of the post-tests.

These results are in agreement with several previous studies in that ballistic exercises improve motor performance speed as the acquired power through this type of training leads to a better motor performance for the sports activity. They also assured the importance of ballistic training as it increases the muscles ability to

Table 1: Sample description on the researcher variables (n=30)

No.	Variable		Measure	Means	Median	SD	Squewness
1-	Basic	Age	Year	17.79	17.80	0.12	-1.18
2-		Height	Cm	185.48	185.82	2.78	-0.15
3-		Weight	Kg	76.99	76.35	3.47	0.29
4-	Physical	30m run	Second	4.37	4.36	0.13	0.48
5-		Throwing the ball with hand	Cm	31.47	31.75	2.44	-0.07
6-		Wide jump from stance	Cm	215.69	217.41	15.80	-0.22
7-		Vertical jump from stance	Cm	51.97	52.61	2.81	-1.32
8-		Triple jump with ascent foot	Cm	9.99	9.60	1.41	1.36
9-		Triple jump with both feet	Cm	8.49	8.43	0.43	0.19
10-		Throwing a medical ball (3kg)	Cm	14.66	14.74	1.08	-0.26
11-		Bending trunk forwards and downwards	Cm	20.14	19.96	1.23	0.60
12-		Shuttle run 4x9m	Second	9.25	9.28	0.20	-0.47
13-		Zigzag run 10m	Second	5.63	5.65	0.09	-0.40
14-		Back muscles strength	Kg	186.94	188.43	10.01	-0.75
15-		Leg muscles strength	Kg	188.29	189.24	9.12	-0.99
16-		Sit-up 30 seconds	Number	26.60	26.54	1.20	0.23
17-		Right fist strength	Kg	57.48	58.85	6.03	-0.63
18-		left fist strength	Kg	52.68	52.86	2.27	-0.13
19-	Skills	Shooting (10 balls)	Point	7.63	7.65	0.22	-0.05
20-		Jump shot after 5 dribbles	point	4.51	4.53	0.24	-0.09
21-		Jump shot after pass and receive (5 balls)	Point	4.49	4.44	0.21	0.66
22-		Jump shot after deceive (5 balls)	Point	4.50	4.44	0.28	0.98

Table 2: Difference significance between pre and post-tests on the studied physical variables (n=30)

		Pre-test		Post-test				
		----------		----------		Means		
No.	Variables	Means	SD	Means	SD	difference	(t)	(%)
1-	30m run	4.37	0.13	4.21	0.14	0.16	9.27	3.66
2-	Throwing the ball with hand	31.47	2.44	34.97	2.22	3.50	11.80	11.12
3-	Wide jump from stance	215.69	15.80	222.38	14.10	6.69	8.06	3.10
4-	Vertical jump from stance	51.97	2.81	56.19	2.86	4.22	9.22	8.12
5-	Triple jump with ascent foot	9.99	1.41	11.68	1.53	1.69	6.81	16.92
6-	Triple jump with both feet	8.49	0.43	9.94	0.49	1.45	7.88	17.08
7-	Throwing a medical ball (3kg)	14.66	1.08	17.22	1.14	2.56	8.43	17.46
8-	Bending trunk forwards and downwards	20.14	1.32	24.23	1.56	4.09	12.55	20.31
9-	Shuttle run 4x9m	9.25	0.20	9.08	0.26	0.16	8.37	1.73
10-	Zigzag run 10m	5.63	0.09	5.54	0.10	0.09	10.54	1.60
11-	Back muscles strength	186.94	10.01	202.65	9.96	15.71	9.95	8.40
12-	Leg muscles strength	188.29	9.12	202.40	8.86	14.11	14.28	7.49
13-	Sit-up 30 seconds	26.60	1.20	31.10	1.37	4.50	7.31	16.92
14-	Right fist strength	57.48	6.03	63.77	6.12	6.28	5.10	10.93
15-	left fist strength	52.68	2.27	57.77	2.75	5.09	9.27	9.66

(t) Table Value on p=0.05 = 1.69

Table 3: Difference significance between pre and post-tests on the studied skills variables (n=30)

		Pre-test		Post-test				
		----------		----------		Means		
No.	Variables	Means	SD	Means	SD	difference	(t)	(%)
1-	Shooting (10 balls)	7.63	0.22	10.02	0.96	2.39	8.54	31.32
2-	Jump shot after 5 dribbles	4.51	0.24	6.39	0.25	1.58	9.69	35.03
3-	Jump shot after pass and receive (5 balls)	4.49	0.21	6.49	0.46	1.62	11.25	36.08
4-	Jump shot after deceive (5 balls)	4.50	0.28	6.72	0.52	1.39	8.84	30.89

(t) Table Value on p=0.05 = 1.69

contract faster and more explosively through the joint's motor range. Results also indicate that ballistic training is suitable for developing muscle speed and power as most exercises are performed explosively without decreasing velocity and elongated contraction is turned into shortened contraction with maximum velocity [10-13].

These results indicate that developing speed strength through ballistic training affects the jumping skills for leg muscles and throwing ability of the arms [6-8, 14].

This clearly shows the effects of ballistic training on the results of the post-test of the experimental group as these differences are due to the positive effect of the recommended training program's content of ballistic exercises.

CONCLUSION

The researchers concluded that the recommended training program had a positive effect on the post-tests of the experimental group on physical variable, with improvement percentage (1.6% - 20.31%) and skills variables,, with improvement percentage (30.89% - 36.08). the use of training aids (elastic cords) contributed greatly in improving the performance level.

RECOMMENDATIONS

The Researchers Recommend the Following:

- Using the recommended training program to develop shooting skill for junior handball players.
- Physical training for shooting should be on the same motor path of the shooting skill.
- Using training aids in training all skills and its related physical demands.

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