

USING BALLISTIC TRAINING IN DEVELOPING EXPLOSIVE STRENGTH & POWER AND ITS EFFECT ON SHOOTING ACCURACY IN JUNIORS' HANDBALL

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Abstract

The development of fitness elements of the foundation stone in the development of skills the ability to handball players and one of the main requirements that help enable the player and governed by the inhabitants and play, especially that skill correction depends primarily on muscle power through the correction from several directions and distances and different angles and Ptokitak variety and places multiple, and you need to provide kinetic momentum is connected to the transfer of power in the player of the two men's body to the arms of the timing correction of the ball by a good consistency, lies the problem of searching through researchers experience being the practitioners and trainers of the game handball noted that some coaches are turning in their training on the implementation of multiple means and methods in the development of power in general and non-specialist through physical exercises explosive speed and distinctive capacity or speed motor exercises and transitional and perhaps some exercises and weightlifting this reason inadequate training march to the requirements of the modern play,. So the researchers felt the use of plastic exercises to develop explosive power and distinct capacity as quickly and its impact on the accuracy of the correction forms to hand reel Nacian.uhedv search:

1-way set up a training program for the development of plastic explosive distinctive ability and the ability of the players as quickly reel Hand junior.

2-see the effect of developing explosive power and distinctive ability to perform fast forms of correction hand reel junior accuracy.

The researchers used the experimental approach to design Almtkavitan groups with pre and post tests.

And it identifies the research community Billabong aspiring hand reel in the denominator Sports Club totaling 28 players were selected the same random way and simple's 20-man squad, and is then divided into two groups the first trial and the rate of (10) players, and the second officer and the rate of (10) players The researchers also .ostkhaddm Ihmalosail statistical treatment of their data, namely, (Alusk arithmetic mean and standard deviation and t-test for independent samples and asymmetric) The most important findings are:

1. Showed significant differences between pretest and posttest results of the control and experimental groups in explosive power and speed and distinctive forms of correction for young players hand reel Development
2. The training curriculum ballistic prepared by the researcher (experimental group) had the effect of improving the explosive speed and the ability and distinctive forms of correction for young players hand reel by the results that have been reached development.

KEYWORDS: Ballistic. Explosive. Strength. Shooting. Handball.

1. INTRODUCTION & PROBLEM OF THE STUDY

Athletic training based on scientific principles is among the most important factors that enable us to reach the highest athletic levels in various games. The developed countries attributed great attention to players' preparation to reach top achievements and ranks in international champions as it reflects the extent of advanced sciences in these countries. Athletic distinction is the outcome of training based on knowledge and practice to make the athletes reach levels which qualify them to take part in championships and competitions. This is done through comprehensive preparation which includes different and overlapping aspects of training such as physical, skilled, psychological functional aspects and other aspects in preparing athletes. There are multiple preparation methods for junior athletes in various games. Each method has its attributes in terms of game type, physiological, physical, skilled, planning, and legal variables. Handball is one of the team games that require various training characteristics to reach achievement. Joining athletic training requires sufficient knowledge about training ways, methods and stages and consistent consideration of integration of training plans structures in terms of physical, skilled, planning, physical and cognitive preparation to achieve the best level in sports and specialized sports. This was asserted by (Mofti Ibrahim, 1998, 213) by saying that: "planning is a consistent and future process by nature tending towards integrated preparation to reach target results and achievements". Explosive strength and power are among the basic physical elements that should be found in the athletes in particular. Ballistic exercises are an effective mean in this field as they are used to overcome lack of velocity. Their performance includes anti-resistant explosive movements in the least possible time as they join weight lifting with intensity ranges from 30% to 50%. This is asserted by (Ahmed Al Farouk, 2003, 255)

as: “it is the ability of muscles to perform movements with the maximum possible against weak and average resistance ranging between 50% and 30%”. Ballistic exercises are the same polymeric exercises but the difference is in intensity. They are movements performed by muscles and depend on the movement of upper or lower limbs. (Amerallah Al Basety, 2009, 33) asserts that: “the intensity of polymeric exercises is 50-70%”. Due to the development in handball and its spread worldwide in most countries of the world, researchers continued searching for solutions of problems related to the skilled performance and achievement to be diagnosed and solved. A lot of field studies tackled properties and special physical abilities related to handball that have a direct effect on developing the physical aspect to raise skilled and technical aspects as well. This is done through approved educational or training curricula that improve basic and important physical characteristics and abilities of shooting skill in handball. The significance of the study lies in setting a training program using ballistic training in developing Explosive strength and power and their effect on accuracy of shooting forms in juniors’ handball to be an expressive means from which trainers benefit to achieve good results.

Problem of the Study:

Developing fitness elements is the cornerstone of developing skilled ability for handball players and one of its basic requirements that enable players to control the course of the game. This is because shooting depends mainly on muscular strength through shooting from many directions and from different distances, angles, times and places. It also needs to provide related movement momentum to transfer strength in the player’s body from legs to arms and then to the timing of shooting with good consistency. The problem of the study came from the experience of both researchers as they are handball practitioners and trainers. They noticed that some trainers implement variable means and methods in developing strength in general and other unspecialized methods through physical exercise of Explosive strength and power or exercises of movement and transitional velocity and even some weight lifting exercises. This is the reason for insufficiency of training courses towards requirements of modern playing. Therefore, both researchers proposed the use of ballistic exercises to develop Explosive strength and power and their effect on shooting accuracy in juniors’ handball.

Objectives of the Study:

1. Preparing a ballistic training program to develop Explosive strength and power for junior handball players.
2. Determining the effect of developing Explosive strength and power and on shooting accuracy in juniors’ handball.

Hypotheses of the Study:

- 1- The ballistic training program has a positive effect on developing explosive and velocity abilities for junior handball players.
- 2- Developing explosive and velocity abilities has a positive effect on shooting accuracy in juniors’ handball.

2. METHODOLOGY

Both researchers used the empirical method by designing two equal groups with pre and post tests.

Population & Sample of the Study:

Population of the study is shown in junior handball players at Al Kassem Sporting Club (players). The sample was chosen randomly (20 players) and then they were divided into two groups: empirical group (10 players) and control group (10 players too).

Determining Validity of Explosive Strength and Power Tests and Shooting Forms for Junior Handball Players:

In order to determine tests of Explosive strength, power and shooting forms for junior handball players, the researchers reviewed sources and references, determined tests and included them in a questionnaire form that was presented to (9) experts and specialists. After data collection, test validity was determined by the Chi² test as shown in table (1):

Table 1: Validity of Explosive strength, power & shooting forms for junior handball players

Serial	Tests	Valid	Invalid	Chi ²	Significance
1	Vertical jump for Sergeant (legs)	9	0	9	Significant
2	Long jump from stationary (legs)	2	7	2.77	Insignificant
3	Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	8	1	5.44	Significant
4	Throwing a medical ball (2 kg) from a standing position by hands (for arms)	5	4	0.11	Insignificant
5	Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	9	0	9	Significant
6	Consecutive jumps in place in 15 s to find ability indication (legs)	2	7	2.77	Insignificant
7	Arm bend and extension from an inclined sprawling position (10 s for arms).	8	1	5.44	Significant
8	Pulling upwards (suspension) with maximum count in 20 s.	2	7	2.77	Insignificant
9	Shooting with jumping and at head level on shooting accuracy squares.	9	0	9	Significant
10	Shooting from a stationary and head level on shooting accuracy squares.	2	7	2.77	Insignificant
11	Shooting from jumping upwards on shooting accuracy squares.	9	0	9	Significant
12	Shooting from jumping upwards on a square divided into 5 circles.	4	5	0.11	Insignificant
13	Shooting from forward falling on shooting accuracy squares.	9	0	9	Significant

14	Shooting from forward falling on overlapped squares measured by degrees.	8	1	5.44	Insignificant
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* The tabular value of Chi² at freedom degree of (1) and significance level (0.05) is 3.84

Scientific Principles of Tests:

Validity:

Test validity is defined by (Mohamed Samy, 2000, 273) as measuring the test for what was accurately measured and not measuring other thing. The researchers used content validity through applying tests on a group of experts and specialists.

Reliability:

Test reliability is defined by (Mohamed Jassem Al Yasseri & Marwan Abdelmegid, 2003, 78) as: “the extent of test accuracy in measurement and consistency of its results when applied multiple times on the same individuals”. For the purpose of extracting reliability coefficient, the researchers used testing and retesting methods and then extracted values of correlation coefficient between results of the first and second tests after seven days. This procedure was made during the exploratory trial as shown in table (2).

Objectivity:

It is defined as “identical opinions of more than one judge when they evaluate a test” (Marwan Abdelmegid, 1999, 155). In order to determine objectivity of the test, the researchers used marks of judges of test results during retesting. Correlation coefficient was counted between degrees of the first and second arbitrators and found that all tests have great objectivity as in table (2):

Table 2: Scientific Principles (Validity & Objectivity Coefficients) for the used tests in the study:

Serial	Tests	Reliability coefficient	Counted R value	Subjectivity coefficient	T counted value
1	Vertical jump for Sergeant (legs)	0.85	3.95	0.92	5.75
2	Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	0.87	4.32	0.93	6.20
3	Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	0.87	4.32	0.89	4.48
4	Arm bend and extension from an inclined sprawling position (10 s for arms).	0.84	3.79	0.85	3.95
5	Shooting with jumping and at head level on shooting accuracy squares.	0.84	3.79	0.91	5.38
6	Shooting from jumping upwards on shooting accuracy squares.	0.80	3.27	0.89	4.48
7	Shooting from forward falling on shooting accuracy squares.	0.84	3.79	0.87	4.32

Pre-Tests

The researchers conducted pre-tests at 3 pm in the closed hall in Shabab Al Kassem Club on 01/02/2015 on sample members (20 players).

Sample Consistency and Groups Equality:

To achieve this purpose, the researchers conducted many procedures to adjust variables although the selected sample is from close age class as well as preventing effects that may affect results of the trial in terms of individual differences for the respondents, so the researchers used statistical methods such as means, standard deviations, mode and skewness coefficient for all related variables, length, weight, time age and training age to determine the reality of consistency as in table (3):

Table 3: shows values of skewness coefficient for the studied variables, length, weight and age less than (±1) which shows consistency among sample members at all variables.

Serial	Variables	Mean	S.D	Mode	Skewness
1	Length	170.71	6.74	166	0.69
2	Weight	64.03	7.69	62	0.216
3	Time age	14.7	1.45	14	0.51
4	Training age	3.25	1.37	3	0.18
5	Vertical jump for Sergeant (legs)	540.20	31.75	510.40	0.93
6	Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	9.20	2.65	7	0.83
7	Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	43.26	2.17	40	0.69

8	Arm bend and extension from an inclined sprawling position (10 s for arms).	13.07	3.11	11	0.66
9	Shooting with jumping and at head level on shooting accuracy squares.	3.44	1.70	2	0.84
10	Shooting from jumping upwards on shooting accuracy squares.	3.10	1.45	2	0.75
11	Shooting from forward falling on shooting accuracy squares.	2.24	0.84	2	0.28

Equivalency of the Study Groups:

One of the important things that should be followed by the researchers is relating differences to the empirical factor upon which both study groups (empirical and control groups) should be equivalent in terms of variables of the study. Before starting the educational method, the researchers sought to achieve this equivalency between both groups. Van Dallen, 1985, 47 referred that each researcher should form equal groups at least in terms of related study variables. The researchers used the following statistical methods: (mean, standard deviation, T test for independent samples) between control and empirical groups as shown in table (4):

Table 4: Equivalency of the sample of the study for pre-tests of the study

Serial	Variables	Control Group		Empirical Group		T Counted Value	Significance
		Mean	S.D	Mean	S.D		
1	Vertical jump for Sergeant (legs)	514.34	19.18	509.96	17.43	0.53	Random
2	Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	8.45	0.57	8.32	0.67	0.46	Random
3	Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	45.45	1.52	45.80	1.42	0.52	Random
4	Arm bend and extension from an inclined sprawling position (10 s for arms).	12.10	1.37	11.70	1.41	0.64	Random
5	Shooting with jumping and at head level on shooting accuracy squares.	2.90	0.73	2.60	0.51	1.05	Random
6	Shooting from jumping upwards on shooting accuracy squares.	2.70	0.82	2.50	0.70	0.58	Random
7	Shooting from forward falling on shooting accuracy squares.	2.40	0.69	2.10	0.31	1.23	Random

Table (4) shows that the T counted values and the study tests are less than their tabulated value (2.10) at significance level (0.05) and freedom degree (18) which achieves equivalency in the studied tests.

Training Method:

After reviewing a lot of studies, researches, theses and proposals in training methods in the field of athletic training science for the purpose of evaluation of contents and the training curriculum with the empirical sample of the study, the researchers set the empirical method with ballistic training to develop explosive strength and power for legs and arms for junior handball players in a period of application from 03/02/2015 to 17/04/2015.

1. This training lasted for 10 weeks.
2. Number of training units is 3 units weekly.
3. Total 30 training units.
4. Training days are Saturday, Monday and Wednesday.
5. The empirical variable in the duration of the single training unit is 35 – 40 in case of horizontal training (horizontal jumping in the presence of barriers) or due to heights to jump from after determining the maximum vertical height in relation to box heights or determining maximum repetition with a fixed time to extract suitable intensity.
6. Break time was given due to the ration of work to rest.
7. The control group was left to train according to its usual daily method.
8. The researchers took into account gradation (gradual training from the easy to the more difficult in increasing training loads to progress and adapt to explosive strength and power for legs and arms. This principle of gradual increase in training loads one of the important principles in contemporary athletic training because it is characterized with gradual increase in components of training load. Enhancing achievement level for any athlete is the direct result for increasing the size and intensity of effort exerted in training (Mohamed Reda Ibrahim, 2008, 67).
9. The researchers determined the used training intensity for the empirical group of the study by determining the maximum ability for players and for each exercise used in the training course. By percentages, intensity was defined for the rest of levels when implementing the training program. The researcher depended on repetition changes, break times and the required intensity.
10. The researchers determined the level of intensity through which explosive strength and power can be developed: (maximum intensity, sub-maximum intensity and medium intensity) as shown in table (5).
11. The researchers asserted the performance of warming-up, muscle extension and joint flexibility exercises at the beginning of each training unit.

12. Intensity was reduced in the last week of the training courses to the level of (medium intensity) to regain recovery and take good rest before conducting post-tests.

Table 5: Intensity Level & Repitition

Serial	Intensity level	Repitition
1	Maximum Intensity (90 – 100%)	4 – 2
2	Sub-Maximum Intensity (80 – 90%)	6 – 4
3	Medium Intensity (70 – 80%)	8 – 6

Post-Tests:

Post-tests were performed for both empirical and control groups after ending the training program on 18/04/2015. The researchers considered providing the same conditions (or closer) and places of pre-tests to meet variables of conditions in post-tests for the samples of the study.

3. RESULTS AND DISCUSSION

Results of tests of explosive strength, power and shooting forms in handball in pre and post tests:

Table 6: Arithmetic means, standard deviations, counted and tabular T values between pre and post tests for tests of the control group

Statistics Tests	Measuring unit	Pre-test		Post-test		T counted value	Significance
		Mean	S.D	Mean	S.D		
Vertical jump for Sergeant (legs)	Watt	514.34	19.18	530.27	18.41	2.18	Significant
Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	cm	8.45	0.57	8.93	0.12	2.40	Significant
Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	Second	45.45	1.52	43.41	1.37	2.78	Significant
Arm bend and extension from an inclined sprawling position (10 s for arms).	Number	12.10	1.37	13.20	1.03	2.18	Significant
Shooting with jumping and at head level on shooting accuracy squares.	degree	2.90	0.73	3.40	0.69	2.86	Significant
Shooting from jumping upwards on shooting accuracy squares.	Degree	2.70	0.82	3.30	0.85	2.30	Significant
Shooting from forward falling on shooting accuracy squares.	Degree	2.40	0.69	2.80	0.78	2.80	Significant

The tabulated value is (1.83) at significance level (0.05) and freedom degree (9)

Results of tests of explosive strength, power and shooting forms in handball in pre and post tests for the empirical group:

Table 7: Arithmetic means, standard deviations, counted and tabular T values between pre and post tests for tests of the empirical group

Statistics Tests	Measuring unit	Pre-test		Post-test		T counted value	Significance
		Mean	S.D	Mean	S.D		
Vertical jump for Sergeant (legs)	Watt	509.96	17.43	554.32	13.96	8.84	Significant
Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)	cm	8.32	0.67	10.30	0.94	4.59	Significant
Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)	Second	45.80	1.42	41.18	1.35	7.82	Significant
Arm bend and extension from an inclined sprawling position (10 s for arms).	Number	11.70	1.41	14.60	1.07	6.32	Significant
Shooting with jumping and at head level on shooting accuracy squares.	degree	2.60	0.51	4.40	0.52	6.19	Significant
Shooting from jumping upwards on shooting accuracy squares.	Degree	2.50	0.70	4.50	0.52	6.70	Significant
Shooting from forward falling on shooting accuracy squares.	Degree	2.10	0.31	3.70	0.48	9.79	Significant

The tabulated value is (1.83) at significance level (0.05) and freedom degree (9)

Results of tests of explosive strength, power and shooting forms in handball for the control and empirical groups:

Table 9: Arithmetic means, standard deviations, counted and tabular T values between pre and post tests for the control and empirical groups

Tests	Statistics	Measuring unit	Pre-test		Post-test		T counted value	Significance
			Mean	S.D	Mean	S.D		
Vertical jump for Sergeant (legs)		Watt	530.27	18.41	554.32	13.96	8.84	Significant
Throwing a medical ball (2 kg) by hands over head from a sitting on chair position (arms)		cm	8.93	0.12	10.30	0.94	4.59	Significant
Hopping (36 m), going (18 m) on right foot and returning on left foot (legs)		Second	43.41	1.37	41.18	1.35	7.82	Significant
Arm bend and extension from an inclined sprawling position (10 s for arms).		Number	13.20	1.03	14.60	1.07	6.32	Significant
Shooting with jumping and at head level on shooting accuracy squares.		degree	3.40	0.69	4.40	0.52	6.19	Significant
Shooting from jumping upwards on shooting accuracy squares.		Degree	3.30	0.85	4.50	0.52	6.70	Significant
Shooting from forward falling on shooting accuracy squares.		Degree	2.80	0.78	3.70	0.48	9.79	Significant

The tabulated value is (210) at significance level (0.05) and freedom degree (18)

4. DISCUSSION

Throughout the previous illustration and analysis of tables, it is clear that there are developments in the studied variables of the empirical and control groups. The researchers attribute the reasons for developing the control group is due to the effect of the ordinary method set by trainers in addition to players' consistency and continuity of training which played a clear role in developing explosive strength, power and shooting forms for junior handball players. (Saad Mohsen, 1996, 98) asserts that: "expert – whatever their scientific and practical cultural origins are – think that training programs inevitably lead to achievement development if based on a scientific basis in organizing, programming training, using suitable intensity, gradual intensity, noticing individual differences, using frequencies and effective break times under the supervision of specialist trainers in good training conditions in terms of time, place and used tools. In addition, regular and continuous players in training units and repetition of the main skills played clear role in this development. Moreover, (Hanafy Mahmoud, 1994, 54) asserted that continuity plays an important role in reaching players high levels in terms of skill's technical performance, accuracy, integrity and high technical performance mechanism. Results also showed that there are significant differences in favor of the empirical group in developing explosive strength, power and shooting forms for junior handball players. The researchers attribute the reason for this development due to the effect of ballistic exercises prepared by the researchers as they contributed to developing junior handball players. Exercises were performed regularly in an effective training intensity with enough break times and they also were characterized by variability to be close to the nature of motor abilities asserted by (Kassem Hassan, 1998, 280) when he said that: "exercises include one or more elements of effectiveness similar in movement or close to movement or its strength". The researchers attribute the reason for this development due to correct legalization of the ballistic training load, choice of good exercises and grading in difficulty degree and training loads. We can notice that the ballistic exercises affected the results of the study. However, the researchers found a difficulty in implementing skills of the training course for this sample due to the existence of certain weights lifted by players during training performance. Therefore, the researchers were concerned with performing exercises correctly to achieve their goals and avoid injuries and errors. In addition, the reason for the development is also due to the used exercises in this group's training course and legalizing training loads in terms of intensity and size due to correct and good scientific principles. This was asserted by (Walid Yehia Mohamed, 2002, 67) as he said: "the use of well designed and implemented programs leads to the development of physical performance and one of the reasons for sport distinction". Using repetition in strength training performance has a positive effect which was reflected on high speed used with the sample. During performance of explosive strength training, individual differences between players should be taken into consideration through maximum training strength for each player and each exercise which is asserted by (Mohamed Reda Ibrahim, 2008, 632) as: "the test of maximum strength for athletes should be in one attempt for each exercise or performing the maximum repetition number in a certain exercise to determine maximum strength for operating muscles for each exercise representing percentage for each exercise (100)". This development is also due to the set of vertical jumping exercises with weight in the ballistic training course as we notice that jumping exercises affected results of the test which was asserted by (Mohamed Hassan Allawi & Abu El Ela Ahmed, 1984, 139) as: "muscular ability of stretching contributes to increase velocity of motor training performance" and also the use of exercises that develop explosive strength with the highest speed and power which stimulate the neural system for quick performance. Abu El Ela Mohamed, 1992, 78 states that strength training requires high speed in order to get better motor performance in competitions. The researchers assert the effectiveness of ballistic exercises selected in training on neural system and help pulse speed and reach good training condition and then positive development in explosive strength. They also found that the use if added weights to the body and quick ballistic training were useful in developing legs' muscular groups

and increasing muscular contraction activity through repetitions in training performance. As a result, muscular and neural consistency and muscular contraction developed which led to easy performance. This agrees with Mofti Ibrahim: 2001, 180 as the higher the consistency in muscles of motor performance and other reverse muscles on the other hand, the more production of muscular strength will be.

5. CONCLUSIONS

1. There are significant differences between results of pre and post tests for the control and empirical groups in developing explosive strength, power and shooting forms for junior handball players.
2. There was an effect of the ballistic training method prepared by the researcher (for the empirical group) on developing explosive strength, power and shooting forms for junior handball players through results found in the study.
3. There is a positive effect of explosive strength and power on developing the skill of shooting forms for junior handball players.

6. RECOMMENDATIONS

1. Using the ballistic training method in developing explosive strength, power and shooting forms for junior handball players.
2. Trainers should be concerned with developing explosive strength and power for their main role in enhancing physical and skilled performance of junior handball players.
3. It is recommended to conduct similar studies to this study and for various age categories and study some functional variables.

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