

The Effect of using Ballistic Training on Some Physical Variables and on the Skill of High Jump Shooting among Handball Juniors

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INTRODUCTION:

The most important objective of sports activity is to reach high level of performance. Sports excellence refers to scientific and mental elegance because it is the result of scientific-based training for individuals with physical fitness who can efficiently perform their specializations. (2: 197)

Modern training is considered a planned scientific-based educational process that aims at reaching highest levels through raising the player's physical and skilful capacity in order to achieve fast, developed and complete performance that all countries seek. Most of these countries are attempting to prepare their products, clubs, and trainers and they also resort to trainers with new ideologies for performance in order to upgrade these products and clubs to greatly represent their

countries at international championships. (12: 21)

Therefore, scholars and professionals of handball must develop the scientific thought of all theoretical and practical handball topics in order to keep respected status of this field and to continue its advancement to achieve great position all over the world. (10: 13)

The study of **Mahmoud, A.** et al. (2005) stresses that the objective of juniors training is to prepare and qualify them to reach global sports level suitable with the characteristics of his age group and its individual characteristics and with his potential biological development. (15: 10)

In his study, **Hassanein, M. S.** (1995) mentions that juniors' training is very important as it forms an essential requirement to get future achievements. So, all potential storages should be revealed when preparing this age group in order to get

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utmost possible benefit of sports training and consequently raising the level of sports achievement.(11: 11)

Another study conducted by **Ibrahim, M. G.** (2004) states that physical preparation is one of the aspects of training in which we depend on to develop players. A player who is not physically prepared for the completion level shows fatigue and frequently loses the ball, in addition to his weak or lack of planning thought. On the contrary, the physically prepared player ends the match the same as he started with controlling the ball and shows sound thought during the different performances with accurate and planned strategies. (13: 57)

Therefore, physical requirements of handball player are the crucial aspect; particularly when levels are close as handball has special characteristics such as the player's fast transfer from attack to defense and the permanent movement during processes of attack and defense. This is in addition to fast performance of attack skills and the player's fast response to defend other

players from the competitor team. (15: 35)

There are various methods of training used to develop physical capacities related to the type of sports activity and the control of the type of used resistance and speed of performance. Examples of these methods include ballistic training since the ballistic resistance is a relatively modern method that relates between elements of biometric training and weights training with using relatively light weights with high speed. (18: 12)

Attack skills are considered the most sensitive and important aspect of training as it usually takes longer time during training. The trainer also thinks and exerts efforts to achieve these skills. These skills are very crucial for both beginner and advanced players as they facilitate getting scores. (13: 93)

Whip shooting with high jump is considered the strongest and most successful and common shoots that affect the defense (goalkeeper). In order to avoid this shoot, the defender (goalkeeper) attempts to get out to meet the shooter and to prevent him from taking

steps for upgrading and this permits to open a gap on the 6 meter line that enables players to use the front attack line in order to achieve goals. (9: 114) In her study, **Aiyed, N. M. (2007)** stresses that the optimal method to train physical capacities of handball is the one in which time path of strength in the working muscular groups is similar to strength time path during skill performance. Ballistic resistance trainings are one of the methods appropriate to develop muscular capacities of handball players because they combine between rapidity and muscular strength. Additionally, they include trainings using (weights-medical balls- weight jacket-Jeter weights). Its trainings are also close in nature to the performance of handball skill as it overcomes the lack of speed resulting from traditional training by weights. (4: 7)

The study conducted by **Al Hawi, Y. E. (2002)** denotes that ballistic training method is used to overcome the lack of speed resulting from traditional training by weights in addition to its ability to develop the working muscles and those stabled for performance. (3:

10) Another study conducted by **Mohamed, M. A. (2010)** stresses that ballistic training includes trainings of light weights lifting with high speeds. This method does not include slow speed, so it keeps compatibility of most games. The researcher has noticed that loads that vary from 30:50 % of maximum weight lifted by a player are the most effective to advance the player's level. (17: 1) In his study, **El Nemr, A. (2007)** says that strength training distinguished by speed increases motor performance. In other words, the strength gained from this training leads to better motor performance for the practiced sports activity by increasing muscles' capacity of retraction with faster rate through the range of motion in the joint during performance with maximum speed. (8: 100) Through his work as a director of juniors sector at Assiut Sports Club and dealing with trainers of juniors, the researcher has noticed that most of them are getting far from weights training fearing that it could harm juniors or they use weights trainings and raise load strength without considering risks of using these weights with this age group.

The researcher has also observed the decrease of juniors' level of performing high jump shooting and he relates this to the lack of muscular endurance either for arms or legs since this skill needs high jump in order that a player can see the net and to jump above the defense. It also requires muscular endurance of arms in order that the ball rapidly and strongly reaches the net angels. In the context of the Union's amendment of technical rules and match systems that a goal scored by a distinguished player with 190 cm height outside the 9 m. and getting down outside the 9 m. will be scored as two goals for his team. This urges the researcher to attempt using ballistic training and to recognize its effect on some physical variables and on the skill of high jump shooting among handball juniors.

OBJECTIVE:

The current study aims to design a series of trainings using ballistic training method and to recognize its effect on:

- Some physical variables of the sample under study
- The level of performing the skill of high jump shooting for the sample under study

HYPOTHESES:

- There are statistical significant differences between means of the pre and post measurements in some physical variables under study in favor of the post measurement.
- There are statistical significant differences between means of the pre and post measurements in the level of performing the skill of high jump shooting in favor of the post measurement.

KEY TERMS:

Ballistic training: a training method in which strength and speed are developed through the complete range of motion and this leads to muscle adaptation in order to work close to the required method for the specific sport.

METHODS:

- **Methodology:** The researcher has adopted the experimental approach as it is appropriate to the study through using pre and post measurements for a single experimental group.
- **Community Sample:** The sample has been selected intentionally representing 20 junior handball players (born in 1998/1999) from

Assiut Sports Club. Homogeneity of the sample has been conducted in terms of the basic variables (age- height- weight-

training age) and skilful and physical variables as indicated in the below table.

Table (1)
Arithmetic mean, Standard deviation, and Inflection coefficient of the sample for basic variables of the study
S=20

| Variables | Unit of Measurement | M | D | I |
|---|----------------------------|----------|----------|----------|
| Age | Year | 14.6 | 0.50 | ٠.٤٤ |
| Height | Cm | 175.7 | 2.29 | ٠.٠٦ |
| Weight | Kgm | 66.2 | 2.28 | -١.٩٢ |
| Training age | Year | 4.05 | 0.89 | -٠.١٠ |
| Motor speed (15 sec. running) | Sec. | 25.45 | 1.28 | ٠.٥٥ |
| Dynamic balance (jump & balance) | Scores/points | 30.1 | 2.73 | ١.٠٥ |
| Muscular endurance of legs (jump vertical capacity) | Cm | 34.65 | 4.78 | ٠.٤٠ |
| Fitness (running & turning for quarter turn) | Sec. | 13.53 | 0.34 | -٠.٨٤ |
| Muscular endurance of arms (pushing a medical ball) | m. | 10.8 | 1.11 | -٠.٦٠ |
| Shooting accuracy (10 balls high jump shooting) | Scores | 5.25 | 0.64 | -٠.٢٥ |

Table (1) indicates that value of the sample's inflection coefficient for the pre measurements used to measure

homogeneity reached +3: -3 and this confirms sample homogeneity.

DATA COLLECTION:

First: tools and systems of measurement and training:

- Restameter to measure height
- medical scale to measure weight
- High jump tool
- curtain to close the net
- wood panel 0.5 m width and 1.5 m height
- chalk
- weight jackets
- light weights
- training plates
- Hand balls
- hoops
- Measuring tape
- training blocks
- stop watch
- Swedish seats
- large chair
- medical balls

Second: Tests

Skilful and physical tests have been determined by reviewing the literature of this topic and the views of (8) experts have been surveyed to determine how appropriate these tests are for handball juniors. The researcher has selected physical and skilful tests that achieved consensus 75% at least of experts' views.

Scientific coefficient of tests:

1- Validity: The researcher used valid distinction by applying tests on two groups, one is (indistinct) from handball junior players at born on 1998/1999 and the other is (distinct) group of juniors born on 1994, each group represents (10) players. Results of the study revealed statistical significant differences between the two groups in favor of the group of older age 1994. The calculated value of "t" varied from(6.34: 15.65) between means of the two groups and it is higher than the table value of "t" and this indicates validity of the tests.

2- Reliability: In order to measure reliability of tests, the researcher used test re-test method on a sample of (10) junior players with time difference (7 days) with same conditions. Conclusions revealed that correlation coefficient was (0.75 : 0.98) between first and second application which is statistically significant and this proves tests are reliable.

Third: the proposed program Program objectives:

The program aims at improving some special physical capacities (motor speed- muscular endurance of legs- muscular endurance of arms- fitness- dynamic fitness- explosive power) for handball juniors at Assiut Sports Club.

Program bases:

- Training loads have been codified according to scientific bases and principles and views of experts in the field of sports training.
- Cycles of loads used weekly is (1:1), (1:2)
- Duration of the proposed training program 12 weeks (3 training units/ week)
- Duration of training unit is 90 min.
- Loads used in the program are medium- high- maximum
- Methods of training used are intervals with high and low intensity and repetitive method
- Continuity and graduation of training in order to achieve higher level of physical performance

Implementation:

Pre measurements:

Pre measurements have been conducted on the study sample from 02/08 to 03/08/2013.

Basic Experiment:

The training program has been applied on the sample for (12) weeks from 04/08 to 24/10/2013 (3units/week) and the unit time is 90 min.

Post measurements:

Post measurements have been conducted for the sample from 25/10/2013 to 26/10/2013 then data have been collected, tabled, and statistically processed.

Statistical processing:

The researcher used the following statistical coefficients:

- * Arithmetic mean
- * standard deviation
- * Inflection coefficient
- * "t" test for significance of differences
- * Pearson's correlation coefficient

The researcher agreed for all results to significance level (0.05)

RESULTS AND

DISCUSSION:

First: Results

Table (2)
Significant differences between pre and post measurements of the sample in physical and skilful variables for handball juniors S=20

| Variables | Pre measurement | | Post measurement | | Value of "t" | Significance | |
|-----------|---|-------|------------------|-------|--------------|--------------|-------------|
| | M | D | M | D | | | |
| Physical | Motor speed (30 m. running) | ٢٥.٤٥ | ١.٢٨ | ٢٩.٨٥ | ٠.٨٨ | -10.49 | Significant |
| | Muscular endurance of legs (jump vertical capacity) | ٣٤.٦٥ | ٤.٧٨ | ٤٠.٢ | ٢.٠٢ | -4.68 | Significant |
| | Muscular endurance of arms (pushing a medical ball) | ١٠.٨ | ١.١١ | ١٢.١٥ | ١.٤٢ | -2.93 | Significant |
| | Fitness (running & turning for quarter turn) | ١٣.٥٣ | ٠.٣٤ | ١٢.٥٣ | ٠.٧٣ | 5.23 | Significant |
| | Dynamic balance (jump & balance) | ٣٠.١ | ٢.٧٣ | ٣٢.٧ | ٣.٠١ | -3.51 | Significant |
| | High-jump shooting | ٥.٢٥ | ٠.٦٤ | ٠.٦٦ | ١.٣١ | -3.86 | Significant |

Table value of "t" at (0.05) = 1.73

Results of table (2) indicate that there are statistical significant differences between means of pre and post measurements of the sample at the significance level (0.05) for all physical and skilful variables in favor of post measurements as the calculated value of "t" reached (2.93: 10.49).

Second: Discussion

Table (2) shows there are statistical significant differences between means of pre and post measurements of the sample for physical variables in favor of post measurements. The researcher relates this to the positive effect of the proposed training program using ballistic training that upgrades the level of physical capacities among. Also, the proposed training program that has been codified according to scientific bases that are performed rapidly with different levels of difficulty has led to an improvement in the muscular work and this has raised the level of legs and arms muscular endurance, motor speed, fitness and balance among the sample.

This result conforms to that of **Abdel Ghaffar, E. A. (2010), Mohamed, M. A. (2010),**

Talaat, A. M. (2003), and Khalaf, A. F. (2003) in that ballistic training manner has led to an increase in the elements of anaerobic capacity, fast power, speed, and fitness.

In his study, **Hassan, K. S. (2007)** sees that balance element plays an important role for handball players since the player who is able to keep his body's center of gravity inside the pivot base between feet without rush towards the competitor prevents him from any attack error that might occur. (7: 61)

The study of Charles I. Staley (1996) states that ballistic training increases the player's speed and his ability to jump through intensive exercises that produce higher ability that cause adaptation in the nervous system. (16: 15)

It is also clear from table (2) that there are statistical significant differences between means of pre and post measurements of the experimental group for the skill of high jump shooting in favor of the post one. This confirms that the proposed ballistic trainings are successful and have an effect on the selected skill. In this regard, the study of Michael Kent (1998)

explores that the development of muscular endurance by ballistic trainings affects any skill that requires ability to jump and shoot and affects arms' ability to throw (shooting- passing), so they are effective exercises for baseball, basketball, swimming, soccer, and handball. (16: 60)

The researcher sees these ballistic exercises are successful because their nature of performance is very close to that of handball since ballistic training increases motor performance speed. In other words, the power gained from this type of training leads to better motor performance of handball through the similarity of performance nature between them.

Also, ballistic training has developed arms and legs' muscular endurance and this led to developing the vital role played by this element in handball. The researcher denotes that the nature of handball requires muscular ability as it plays an important role in the skill of high jump shooting for it requires explosive performance of legs and arms in addition to high degree of energy. This has been asserted by **Darwish, K.**

et al. (1998) who refers that the nature of performing handball requires a player with muscular ability for legs and arms that helps him to move and shoot in addition to fast passing. (11: 168)

Another study conducted by **Hamouda, Kh.** And Galal, K. (2008) mentions that the basic of high jump shooting skill to rise to the highest point of the net above defenders. In other words, the more high is thee the height, the more free for shooting and getting scores. This is one of the most successful and strong common shoots that affect defenders and goalkeeper. (9: 114)

The researcher relates the improvement of the skilful level to the development of speed; particularly motion speed as a result of ballistic training. This is because speed is an important element during skilful performance; especially when performing the shooting skill. It is also important for developing legs muscular ability that helps to upgrade arms muscle representing strong and fast shooting. It also helps the player to change his body position in the air and develops his ability to balance

himself either on air or while landing after shooting.

Conclusions:

In view of the above mentioned objectives and hypotheses, the researcher concludes that the proposed ballistic training that has been codified according to scientific bases, which includes series of ballistic exercises performed with fast rates and different levels of difficulty, exchange of directions and spaces with combination of various motions in a single framework, has improved the level of performing some physical and skilful variables and improved the skill of high jump shooting among handball juniors.

RECOMMENDATIONS:

The researcher recommends the following:

- 1- To apply the training program that includes the ballistic trainings used in this study on junior handball players and similar age players.
- 2- To use the loads with different intensities under study for the preparation period when planning for training programs according to the specific objective for each stage.
- 3- To conduct similar studies and research on different training ages.

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