

DOI 10.14526/01_201_200

THE CORRELATION BETWEEN TRAINING WITH WEIGHTS AND PLYOMETRIC TRAINING, AND THEIR IMPACT ON THE DEVELOPMENT OF CERTAIN PHYSICAL QUALITIES IN SHOOTING IN EXTENSION FOR HANDBALL PLAYERS

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Annotation: Strength training is the basis for the physical preparation of players of different age groups. Many researchers highlight the need for weight training in the content of training programs. The aim of this research is to understand the correlation between weight training and plyometric training and their impact on the development of certain physical qualities and the extension shooting for handball players (13-15 years) through a proposed training program for identification of the following: Effect of training with weights and plyometric training and their impact on the development of certain physical qualities and shooting in extension for Handball players.

Materials. The research sample consisted of 64 cadet players, practicing in four different teams in the Hand Ball regional championship, in the west, divided into four groups of 16 players. The researchers carried out an experimental method using four groups; three experimental groups and one fixed. The first group uses training with weights, the second group uses plyometric training, the third group uses the combined (with weights and plyometric) and the fourth uses usual traditional training. The experimental work took place for three months **Research methods.** Scientific-methodical and special literature analysis, testing, pedagogical experiment, methods of mathematical statistics. **Results.** The results showed progress in the experimental groups, in particular the mixed application group (weightlifting and plyometric). The effectiveness of the development of certain physical qualities and the extended shooting of handball players (13-15 years-male) showed it vividly.

Keywords: modern training, the planning of youth training, plyometric training, combined training.

INTRODUCTION

The planning of youth training in various sporting activities has become a necessary means for advancing the training of players. Considerable scientific progress in the methods of training and preparation of players based on scientific facts provided by other sciences as biological, psychological, social or technological fields which led to a better implementation of the training process.

The subject of physical character has always interested many scientists and researchers from various disciplines, who have agreed on its paramount importance; because they constitute a conviction for the athlete, to reach the highest levels of the sport.

In order to improve the physical qualities of the game, coaches must have sufficient knowledge about the standards of modern training and its processes; This for the good on the ground through the realization of training programs that take into account the requirements of efficiency and follow-up the most significant events, mainly on the physical level, using the most appropriate and most effective training methods.

Handball is among the collective sports that have existed since time immemorial, and it was not long before the occupation of its place among the other games, because of its speed and enthusiasm (8)

Strength training is the basis for the physical preparation of players of different age

groups. The performance depends on the movement of the body, and by more effective contractions and thus increase the speed and jump in extension for the performance of a player. Many researchers highlight the need for weight training in the content of training programs (15)

Plyometric is one of the recommended training methods for improving power in detents and in running speed. It leads to improvements in performance particularly in activities requiring explosive muscle contractions (11). The Plyometric training techniques are used by athletes in all types of sports to increase strength and explosiveness (4). Plyometric consists of a rapid stretching of a muscle (eccentric action) immediately followed by a concentric or shortening action of the same muscle and connective tissue. The stored elastic energy within the muscle is used to produce more force than can be provided by a concentric action alone (12).

In dealing with the latest studies, researchers have deduced that plyometric training, for the development of physical qualities as well as training with weights. Previous studies have recognized the need to use these methods for muscle development, especially the lower limbs and extension. This is consistent with the previous study of Hamdi sofiane (2011), Matavulj and all (2001) ,and the study of Vldan milié (2008) .(20,13, 22).

Perez-Gomez (2008) evaluated the effect of combined weight training and plyometric exercises on some aspects of physical fitness such as vertical jumping and anaerobic capacity in soccer players in a six-week period and stated that after the training period all players showed significant improvement in vertical jump and anaerobic capacity tests (16).

The problem of the study through the field monitoring, at the level of the teams of the national handball championship, and the lack of diversification and combination of modern methods of training, especially in the development of particular physical qualities. Despite the confinement of weight training programs in some teams, and plyometric training to others, we noted the correlation

between these different styles, in the development of certain physical characteristics and shooting in extension of Handball players.

The aim of this research is to understand the correlation between weight training and plyometric training and their impact on the development of certain physical qualities and the extension shooting for handball players through a proposed training program for identification of the following:

1. Effect of training with weights and plyometric training and their impact on the development of certain physical qualities and shooting in extension for Handball players.

2. Main differences between the effect of training with weight and both (weight training and plyometric training) on certain physical characteristics and the extension shooting for handball players.

3. Reciprocal interactions of the effect of weight training and combined training, in the development of certain physical characteristics, and extended shooting for Handball players.

Research Procedures:

Research methodology: The researchers carried out an experimental method using four groups; three experimental groups and one fixed.

Participants

The research sample consisted of 64 cadet players, practicing in four different teams in the Hand Ball regional championship, in the west, divided into four groups of 16 players.

The first group uses training with weights, the second group uses plyometric training, the third group uses the combined (with weights and plyometric) and the fourth uses usual traditional training.

Physical tests

1. Course 30 m
2. Shuttle Race
3. Vertical jumping
4. Launch the Ball medicine (3 kg)
5. Shooting at goal

Statistical Analysis

Data is presented as mean \pm standard deviation. Changes in performance between training

groups were compared using an independent t-test using Microsoft Excel. Within-group

analysis was also done using a dependent t-test. A value of $p < 0.05$ was used to determine the significance of the results within the experiment. And test of F with value of $p < 0.05$.

The basic experience

Applied the basic experience for twelve (12) weeks at the rate of three training seance for the week, the time of the seance 80 minutes, taking into account the principles of carrying training. Used the first group weigh training program, the second group plyometric training, the third group applied mixed training combining weigh training and plyometric training any alternate until the end of the experience. The fourth group receive regular training as a group control.

RESULTS

Table (01): equality between the fourth groups in research variables

Tests	Variances	Total deviations	Degree of freedom	Average of squares	F calculate	Level of significance
Course 30 meter	Between Groups	0.22	03	0.09	0.85	Not Significat
	In the groups	12.31	60	0.20		
Shuttle course	Between Groups	0.08	03	0.01	0.36	Not Significat
	In the groups	5.04	60	0.06		
launch medicine Ball 3 kg	Between Groups	0.79	03	0.29	0.64	Not Significat
	In the groups	25.44	60	0.37		
Vertical Jump	Between Groups	0.39	03	0.05	1.66	Not Significat
	In the groups	3.59	60	0.08		
Shooting at goal	Between Groups	0.58	03	0.18	0.45	Not Significat
	In the groups	25.69	60	2.16		

Table F = 2.76, Significance Level 0.05

The value of F Tabular trend display at the level of the no significance of the 0.05 = 2.76. It is clear through the results of table (01) differences statistically function at the level of the significance of 0.05 and the degree of

freedom (60-3), F Tabular trend display 2.76 the smallest F calculated each tests this requires the use of the method of Tioki breach of finding more accurately the moral teams.

Table (02): the differences between the the averages of the tests in each group

Groups	Tests	Measurements before		Measurements after		T calculate	% Of progression
		X	Y	X	Y		
Weights training group	Course 30 meter	5.80	0.56	5.50	0.53	21.63	32.67
	Shuttle course	22.44	0.78	19.77	0.71	7.26	37.08
	launch medicine Ball 3 kg	8.12	1.26	11.18	1.60	09.32	40.35
	Vertical Jump	3.04	0.33	3.67	0.25	06.30	21.72
	Shooting at goal	03	1.52	07	1.57	08.38	14.50
Plyometric training Group	Course 30 meter	5.80	0.11	5.54	0.21	16.04	27.36
	Shuttle course	22.32	0.06	19.15	0.20	19.45	33.21
	launch medicine Ball 3 kg	08.06	1.28	12.18	1.42	07.72	41.11
	Vertical Jump	3.12	0.22	3.92	0.27	8.41	25.64
	Shooting at goal	3	1.49	7	1.58	16.35	24.39
Combined training group (with weights & plyometric)	Course 30 meter	5.82	0.12	5.52	0.22	23.59	39.77
	Shuttle course	22.35	0.21	19.01	0.30	19.97	44.44
	launch medicine Ball 3 kg	8.0	1.25	12.31	1.29	10.26	53.87
	Vertical Jump	3.14	0.24	4.02	0.37	06.67	28.02

	Shooting at goal	4	1.52	8	1.48	17.39	28.51
Control Group	Course 30 meter	5.83	0.60	5.77	0.59	07.75	17.71
	Shuttle course	22.17	0.93	21.23	0.76	7.81	12.22
	launch medicine Ball 3 kg	8.25	1.38	10.06	1.33	8.24	21.93
	Vertical Jump	2.98	0.40	3.34	0.56	4.50	12.08
	Shooting at goal	3	1.26	5	1.35	14.66	7.57

T of Table 2.13, degree of freedom 63, level of significance 0.05

Checking table (02), it's obvious that there exist significant differences between calculated averages for both pre-test and post-test sample measurements on whom set of training with weights were applied aiming to develop the distinctive strength speed as the players of the handball, where calculated T was estimated to between 6.30 as the smallest value and 21.63 as the largest value is greater than the value of T tabular which reached 2.13 at degree freedom 15, level of indication 0.05 which means that there exist a statistically significant difference in favor of the sample post measurement.

The existence of significant differences between calculated averages of pre and post measurement of the sample on which the set of plyometric exercises were applied aiming to develop the strength characterized by speed for high parties muscles where calculated T was estimated between to 7.72 and 19.45 which is higher to tabulated T that reached 2.13 in the freedom degree of 15 and significant level of 0.05. Which means that there were significant differences in favor of post test concerning the research sample.

The existence of significant differences between calculated averages of pre and post measurement of the sample on which the set of mixed training (weight and plyometric) were applied aiming to develop the strength characterized by speed for high parties muscles where calculated T was estimated between to 7.67 and 23.59 which is higher to tabulated T that reached 2.13 in the freedom degree of 15 and significant level of 0.05. Which means that there were significant differences in favor of post test concerning the research sample.

And it's obvious that there exist significant differences between calculated averages for both pre-test and post-test sample measurements on whom set of traditional training were applied aiming to develop the distinctive strength speed as the players of the handball, where calculated T was estimated to between 04.55 as the smallest value and 14.56 as the largest value is greater than the value of T tabular which reached 2.13 at degree freedom 15, level of indication 0.05 which means that there exist a statistically significant difference in favor of the post measurement for sample control.

Table (03): analyzes deference between the four groups in search tests

Tests	Source of Deference	Total Deviations	Degree of Freedom	Square Mean	F Calculate	Significance Level
Course 30 meter	Between groups	5.15	03	2.08	41.8	Significance
	In the groups	3.43	60	0.05		
Shuttle course	Between groups	9.47	03	3.06	35.25	Significance
	In the groups	4.23	60	0.08		
launch medicine Ball 3 kg	Between groups	52.9	03	15.46	6.74	Significance
	In the groups	95.68	60	2.54		
Vertical Jump	Between groups	4.39	03	1.46	8.58	Significance
	In the groups	10.52	60	0.17		
Shooting at goal	Between groups	351.68	03	117.22	47.59	Significance
	In the groups	145.42	60	2.53		

F of table = 2.76, level of significance 0.05

The value of F Tabular trend display at the level of the significance of the 0.05 = 2.76. It is clear through the results of table (03) differences statistically function at the level of

the significance of 0.05 and the degree of freedom (60-3), F Tabular trend display 2.76 The smallest F calculated each tests this

requires the use of the method of Tioki breach of finding more accurately the moral teams.

DISCUSSION

We note, through Table (02), significant differences between the preliminary and the subsequent test of the experimental samples. Where there is a statistically significant difference in the control group. The researcher reports it to the effect of training, but this improvement was not consistent. As can be seen from the previous and subsequent results on the 30 m test samples, the weight group outweighed that of the plyometric test.

The researcher showed a correlation between high and vertical jumps with the same qualities as Hand Ball. This was confirmed by Sobhi Hassanine (1997), supported by Talha Houssam Eddine and al. Weight training is used to drill the muscles, and that of speed can progress through weight. were Radcliffe (1994) adds, offers ideas on how resistance training and plyometric should be used together in training to develop all the components of power. He gives an example of a resistance training session in which the athletes are not only lifting weights, but are also doing plyometric work such as squat jumps and medicine ball drills in between resistance training exercises (17). And Bielik, Lundin, Chu, and Rogers (1986) recommend that plyometric be used before resistance training. Gambetta believes that resistance training and plyometric should not be combined. He states that mixed training gives mixed results.

We note through the table (03) concerning the test of the race had results superior to those of the control group, that of plyometric more than that of the weight. The practice of the plyometric has generated interesting results, improving the strength of the feet.

Essayed Abdelmaqssoud (1997) quotes that the plyometric training accentuates the speed of the movements, with an average of explosion during the movement. This is consistent with the study by Hamdi sofiane (2011), Vladan milić (2008) demonstrating that the plyometric training program has a

positive effect on the development of physical qualities of the sample the research.(20, 22).

The effectiveness of a plyometric program depends on sport-specific movements and the appropriate intensity and frequency of the plyometric program. Sport-specific movements enhance neuromuscular development, which allows the athlete to perform a specific movement with a greater amount of available muscle mass. The increased use of muscle mass allows for greater force generation during the movement (5).

Through the previous results demonstrated in the table, it was noted that the experimental groups have achieved considerable development. The plyometric training group was better than the training with weights group. This is explained by the consistency during the plyometric, in the jump exercises in height, from where the muscles are moving, and helps to more explosion. This is consistent with the vision of Christos (2006), Matavulj and others (2001). They find that the number of the muscular fibers increases hence the accentuation of force (12, 13)

Through the preliminary and posterior results of the sample to the medical ball thrust test, it appears that the group at the plyometric training was better than that of the training with weights.

The researcher explains that the plyometric training accentuates the performance of the movements, from where the muscles are forged considerably, and these muscles are consolidated, without generating an increase of the mass of the muscle, and to the weight of the body. This is what Abderrahmane Ezzahar quotes. The results obtained correspond to those of the study by Yasser Debbour (1996). And this is consistent with the study of Labuber Christon Anne (1993), Kotzamanidis, C (2006), Hamdi Sofiane (2011) and Benzidane houcine & al (2015) and Bensikadour & al (2005).(10, 9,20 , 3, 2).

Through the results obtained in the combined training group, it was noted that this was the best. The importance of this combination is noted, in order to achieve good physical development results for Handball

players, also confirms Hooks Gene (1996) the distinctive strength speed as necessary if we are to reach the highest levels of excellence and sporting success, which requires this type of power production strength as well as speed in the jump movements and jump and bounce and so requires athletic specialist activity (5, 18).

The researcher finds that extension is necessary for the game of Handball. This is confirmed by the results obtained during the tests of the shooting: Extension and realization.

Deductions:

1. Weight training, plyometric training, and combined training are of great importance to the development of certain physical qualities and to the improvement of extension shooting for Handball players.

2. Plyometric training is useful for the development of foot muscles.

3. Plyometric training is useful for the development of the horizontal jump, and better than the weight training.

4. There is similarity between the research samples and some differences in the rate of performance.

5. Combined training has more effects.

6. There is a complementary correlative relationship between weight and plyometric training.

Acknowledgments

Our thanks and appreciation to the Presidents and trainers and Players in clubs in of the championship regional of Handball in Algeria to participate in the completion of research.

References

1. Ahmed Abdel Rahman and Azzedine Bakri. *Sistema sportivnoj trenirovki* [Sports training system]. Dar al Fikr Al Arabi, Cairo, 30, 2004.

2. Bensikaddour habib, Benzidane Houcine, Ahmed Benklaouz Touati, Djamel Mokrani. 2015. The effect of using plyometric exercises to improve some Physical Abilities and performance in triple jump. *Shvedskij zhurnal nauchnyh issledovanij* [The Swedish journal of scientific research]. 2015, Vol. 2, No.11, pp. 53-61.

3. Benzidane Houcine, Habib Bensikaddour, Djamel Mokrani. Effects of Plyometrics Training to Improve a Physical Capacity and Athletic Performance to High School Students (17-18) Years Old. *Amerikanskij zhurnal sportivnoj nauki* [American Journal of Sports Science]. 2015, Vol. 3, No. 5, pp. 98-102, DOI: 10.11648/j.ajss.20150305.14

4. Chu D.A. *Prygauchaya pliometriya* [Jumping into plyometric], Human Kinetics, Champaign, il., 1998.

5. Gene Hooks. *Vazhnoe rukovodstvo k krahmaleniyu* [The Essential Guide to starching]. Grown paper flacks Co, New York. 213p., 1996.

6. Imad Eddine Abu Zaid. *Nauchnye osnovy planirovaniya i postroeniya romandy v romandnyh vidah sporta* [Scientific foundations and planning for team building in team sports]. Higher Education Printing, Baghdad, pp. 151-156, 1998.

7. Jacques Mariot. F. Pouget. *Povedencheskij gandboll* [The behavioral handball]. Edition Vigot paris, 2008.

8. Kamal Aref and Saad Ismail. *Gandboll* [The Handball]. Book Publishing Center, University of Baghdad, 109, 1989.

9. Kotzamanidis Christos. Effect of plyometric training on the performance and vertical jumping in prepubertal boys. *Zhurnal nauchnyh issledovanij i razrabotok* [Journal of research and development]. 2006, No. 20 (2), pp. 441-445.

10. Labuber, Christon, Anne. *Effekt pliometricheskogo obucheniya na vybrannyh myshchah nog i mochnost' po sravneniyu s trenirovkoj vesa* [The Effect of plyometric training on selected measures of leg strength and power when compared to weight training]. Unpublished MA Dissertation centered Michigan Univ. 1993.

11. Laurent malisoux. Stretch-shortening cycle exercises: an effective training paradigm to enhance the power output of human single muscle fibers. *Zhurnal prikladnoj fiziologii* [Journal applied physiology]. 2006, No. 100, pp.771-779.

12. Marginson, V., Rowlands, A, Gleeson, N. and Eston, R. Comparison of the symptoms of exercise-induced muscle damage after an initial and repeated bout of Plyometric exercise in men and boys. *Zhurnal prikladnoj fiziologii* [Journal of Applied Physiology]. 2005, No. 99, 1174.

13. Matavulj, D., Kukolj, M., Ugarkovic, J., Tihanyi, J. and Jaric, S. Effects of Plyometric Training on Junior Basketball Players. *Zhurnal sportivnoj mediciny i fizicheskoy kul'tury* [Journal of Sports Medicine and Physical Fitness], 2001, 41, 159.

14. Nahid Adibpour, Hojatolah Nik Bakht and Naser Behpour. Comparison of the Effect of Plyometric and Weight Training Programs on Vertical Jumps in Female Basketball Players. *Vsemirnyj zhurnal sportivnyh nauk* [World Journal of Sport Sciences], 2012, No.7 (2), pp. 99-104, DOI: 10.5829/idosi.wjss.2012.7.2.1173

15. Ouajdi Fateh, Lotfi Essayed. *Nauchnye osnovy podgotovki igroka i trenera* [Scientific bases of the training of the player and the coach]. publication Dar Al-Houda, Egypt. 2003, pp.34-36.

16. Perez-Gomez J.P.G.J. Effects of weight lifting training combined with plyometric exercises on physical fitness, body composition and knee extension velocity during kicking in football.

Prikladnaya fiziologiya, pitanie i obmen veshchestv [Applied Physiology, Nutrition and Metabolism]. 2008, No.33(3), pp. 501-510,2008.

17. Radcliffe J. A Power Perspective. *Associatsiya nauchnoj sily i rondocionirovaniya* [National Strength and Conditioning Association]. 1994, No. 16(5), pp. 46-47.

18. Rahimi, R., & Behpur, N. The effect of plyometric, weight and plyometric-weight training on anaerobic power and muscular strength. *Universitet fizicheskogo obrazovaniya i sporta* [University of Physical Education & Sport]. 2005, No. 3(1), pp. 81-91.

19. Daniel C. Bishop, Russell Smith, Mark Smith, Hannah E Rigby. Effect of Plyometric Training on Swimming Block Start Performance in Adolescents. *Zhurnal prochnosti i kondicionirovaniya issledovanij* [The Journal of Strength and Conditioning Research]. 2009, No. (7)21, pp.37-43.

20. Sofiane, Hamdi. 2011. The effect of two methods of training, plyometry and weight training, on the economy to race and on explosiveness in soccer players. Canada: Brief presented as a partial requirement of the Master in Kinanthropology University of Quebec in Montreal. 02, 2011.

21. Toplica stojanović. Radmila kostić. The effects of the plyometric sport training model on the development of the vertical jump of volleyball players. *Fizicheskoe vospitanie i sport* [Physical education and sport]. 2002, Vol. 01, No.9.

22. Vladan milić. Dragan nejić. radomir kostić. The effect of plyometric training on the explosive

strength of the muscles of volleyball players on single foot and two-foot takeoff jumps. *Fizicheskoe obrazovanie i sport* [Physical education and sport]. 2008, Vol.6 No. 2. pp. 169-179.

23. Kuznetsova Z.M., Cergejchev V.N., Glazistov A.V. Patterns of learning, training youth hockey players 7-10 years. *Pedagogiko-psihologicheskie i mediko-biologicheskie problemy fizicheskoy kul'tury i sporta* [Pedagogico-psychological and medico-biological problems of physical culture and sports]. 2007, No. 2(3), pp. 37-51.

24. Kuznetsova Z.M., Razumov D.V. Optimizarion of tactics of implementation of the serve in tennis athletes 11-14 years of age. *Pedagogiko-psihologicheskie i mediko-biologicheskie problemy fizicheskoy kul'tury i sporta* [Pedagogico-psychological and medico-biological problems of physical culture and sports]. 2007, No. 1(2), pp. 21-28.

25. [Kevin C. Brosnan](#), [Kevin Hayes](#) & [Andrew J. Harrison](#). Effects of false-start disqualification rules on response-times of elite-standard sprinters. *Zhurnal sportivnyh nauk* [Journal of Sports Sciences]. 2017, Vol. 35, No. 10, pp. 929-935. DOI <http://dx.doi.org/10.1080/02640414.2016.1201213> (Scopus)

26. [Allan V. Horwitz](#). Social Context, Biology, and the Definition of Disorder. *Zhurnal o zdorov'e i sportivnom povedenii* [Journal of Health and Sport Behaviour]. 2017, Vol. 58, No. 2, pp. 131-145. (Scopus)

Submitted: 24.04.2017

Received: 27.04.2017

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For citations: Mokrani Djamel, Benzidane Houcine, Koutchouk Sidi Mohamed, Bencheni Habib. The correlation between training with weights and plyometric training, and their impact on the development of certain physical qualities in shooting in extension for handball players, *The Russian journal of physical education and sport (pedagogico-psychological and medico-biological problems of physical culture and sports)*, 2017, Vol. 12, No.2, pp. 14-20.

DOI 10.14526/01_2017_201

WSB BOXERS' COMPETITIVE ACTIVITY STUDY

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