

**Impact of the Plyometric Training on the Vertical Jump Performance -  
Case of Young Soccer Players under U12s**

*Zerf Mohammed*

*Physical and Sports Education Institute Mostaganem, Sports Training department laboratory OPAPS,  
University Abdel Hamid Ibn Badis Mostaganem, Algeria*

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University Abdel Hamid Ibn Badis Mostaganem

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### **Abstract**

*Objectives: Muscle strength is an essential factor to perform effectively kicks, tackles, jumps, sprints and prevent injuries in the soccer game (Benítez Sillero, J.D.; Da Silva-Grigoletto, M.E.; Muñoz Herrera, E.; Morente Montero, A. y Guillén del Castillo, M, 2015). Whereas to simulate the explosive strength needed in athletics, Verkhoshanski' introduced the Plyometrics (William D. Bandy, Barbara Sanders, 2007) that (Bram Swinnen, 2016) confirms its. However, little research has been done to investigate injury risk with plyometric training considerations. Where some authors suggest that plyometric exercises should not be performed by children (Jason Brumitt, Human Kinetics, 2010) or an individual who has not attained puberty (Edward McNeely, David Sandler, 2006). Design: the effects of Plyometrics training on vertical jump performance have been widely researched. Where some authors reported its effectiveness in vertical jump, while others reported no significant effects. Methods: for propose, our experimental protocol was integrating in the program of the coach for a period of 6 weeks as a 20 minutes' time Plyometrics works per week session as additional exercises in the benefit of the experimental group. Results: Our results confirm the benefits of Plyometric training to improve the Vertical Jump Performance among young soccer players under U12s years where the experimental group is accrual performance than the control group. Conclusions: the pubescent athletes can engage in low- to medium-intensity Plyometrics.*

**Keywords:** Plyometric Training, Vertical Jump, Young male Soccer Players under U12s.

### **Introduction**

Training for power is one of the most controversial topics in athletic training. Most athletes would love to be more powerful, but few agree on the methodology (Boyle Michel, 2004). Therefore, it is often suggested that a strength program should initiate a Plyometrics (George Davies, Bryan L. Riemann, and Robert Manske, 2015). Where Plyometrics training was introduced to differences disciplines sports to improve speed and strength and produce power (National Soccer Coaches Associatin of America, 2004). Whereas the primary goal of plyometrics training is to improve jump ability by using the stretch reflex to facilitate recruitment of additional muscle motor units (Aquatic Exercise Association, 2010). Whether the benefits of plyometrics training are well accepted, if the stress of repeated jumps or ballistic movements do not increase the risk for soreness or injury according to (Hoffman, Jay, 2014). From the proof that Plyometrics is a method of training muscle elastic strength and explosiveness to enhance athletic performance (Wenjiang Du, 2012). Where Several studies suggest that Plyometrics training, either alone or in combination with other typical training modalities such as weight training, elicit numerous positive changes in neural and musculoskeletal systems, muscle function, and athletic performance. (SOZBIR, Kerim, 2016)

As that our goals in this study come to test the hypothesis which confirms that plyometric training has been widely used for increasing dynamic athletic performance such as vertical jump height, sprint speed, agility, and endurance (Duncan MacDougall, Digby Sale, 2014) (Franco-Márquez, F.,

Rodríguez-Rosell, D., González-Suárez, J. M., Pareja-Blanco, F., Mora-CustodioR., Yañez-García, J. M., & González-Badillo, J. J., (2015). Where some specialists confirm that Plyometric training should not be done by an individual has reached puberty (Laurel T. Mackinnon, 2003). For propose, our experimental protocol was integrating in the program of the coach for a period of 6 weeks as a 20 minutes' time Plyometrics works per week session as additional exercises in the benefit of the experimental group. Whether our assuming was based on squat-jump (SJ) and the counter-movement jump (CMJ).

## Material and Methods

The researcher used the experimental method using two groups, one as experimental and the other as control. Its goal is to answer the most common questions that more and more, coaches and parents are asking, "When is it safe for my child to start strength training?" (Scott Riewald, 2012).

### *The research sample:*

The research sample included (40) forty male players under U12s Years of a team sidi ali Algeria their Baseline characteristics are listed in table 1. Dived in two groups (experimental group and Control group) The protocol of the current study was integrating in the program of the coach for a period of 6 weeks as a 20 minutes' time Plyometrics works per week session as additional exercises in the benefit of the experimental group. The study was approved by laboratory OPAPS "Institute of Physical Education of our University".

### *Testing Protocol*

Test (1): vertical jump to the top from stability "Sargent"

Description / procedure: the athlete stands side on to a wall and reaches up with the hand closest to the wall. Keeping the feet flat on the ground, the point of the fingertips is marked or recorded. The athlete then stands away from the wall, and jumps vertically as high as possible using both arms and legs to assist in projecting the body upwards. Attempt to touch the wall at the highest point of the jump. The difference in distance between the reach height and the jump height is the score. The best of three attempts is recorded. (Hamzoui hakima,missaliti lakdarb,Zerf Mohammed, 2016).

Test (2): Bosco Countermovement Jump (CMJ). the subject starts in a straddle position (one foot slightly forward), squats down to a pre-determined height and immediately jumps up from that position. The best result of at least three attempts is recorded - athletes may continue to jump as long as improvements are being made. (Jeffrey C. Pagaduan, Xavier De Blas, 2013) Height can be calculated using this formula:  $\text{jump height} = 4.9 \times (0.5 \times \text{Time})^2$ . The jump height is usually greater than achieved with the Squat Jump.

## Statistical Analyses

We chose Levene's Test to assess the equality of variances for a variable calculated were The correlation coefficient,  $r$ , and the coefficient of determination,  $r^2$  to measure the strength and the direction of a linear relationship between two variables. the T Student was used to compare the results of the pre and post tests used for the experimental and control groups. The statistical methods are based on the arithmetic average standard deviation, in addition to the equation of the progress ratio to know the output throughout the basic experiment in the research. (Zabchi Noreddine, Mokrani Djamel , Benzidane Houcine , Sebbane Mohammed, 2016) All data analysis was performed by means of the IBM-SPSS

statistical software 20.0 for the level of Windows (SPSS, Inc., Chicago, IL). statistical significance was set at p less than 0.05.

**Results**

The Student t-test was used to determine the homogeneity of the two sample groups: experimental and control, in these tests.

Table 1. Exposed the Homogeneity of the sample control and experimental results in the tribal test

Variables	Groups	Mean±SD	T	P≤0,05	Levene's Test	
					F	P≤0,05
Age (years)	Experimental	11.26±0.92	0.25	0,65	,01	,94
	Control	11.55±0.67				
Weight (kg)	Experimental	33.33±4.11	0.38	0,86	,03	,96
	Control	34.04±4.15				
Height (cm)	Experimental	133±6.47	1.02	0,34	,01	,95
	Control	132±6.28				
S-J (cm)	Experimental	30.72±0.47	-,209	,836	,008	,931
	Control	30.82±0.36				
CMJ (cm)	Experimental	22.52±2.12	-,084	,934	,037	,89
	Control	22.45±2.42				

From Table 1, we find that the calculated value of (T) ranged between 0.05 and 1.04, and all of them are smaller than P≤0,05. This means that the difference between the averages is statistically insignificant, i.e. that members of the two samples are homogenous and that the random differences that have emerged are only individual differences among them thing confirm by Levene's Test which is greater than P≤0,05. whereas to compared the standards norms with the levels of our sample we refer to (Jay Hoffman, 2006) Which displays all the criteria starting from age 13 years, were those norms confirms to us the importance of search and needed.

Table 2. Exposed the comparison of the post tests for the experimental and control samples

Variables	Groups	Mean±SD	T	P≤0,05	R	R <sup>2</sup>
S-J (cm)	Experimental	32.41±0.43	3.53	0,00	,88**	,78**
	Control	30.97.± 0.52				
CMJ (cm)	Experimental	23.80±2.81	2.12	0,04		
	Control	23.27±2.22				

From Table 2 All T test are significant in the post tests in the benefit of Experimental group where The correlation shows linear association between two variables which is attributed to the independent variable in our case the training method.

## Discussion

Based on the statistical applied. Our results confirm:

In one hand that Numerous studies have shown that The plyometric training increases the explosive performance in both children and young adults, regardless of their previous athletic experience, sex, and training status (SOZBIR, Kerim, 2016). where our results line with (James Crossley, Naomi Wilkinson, 2014) to improve the muscles to reach maximum force in the shortest possible time, it is possible on the basis of Plyometrics training according to (Zen Martinoli, 2015).

In other we agree that The plyometric exercises can be performed by children where our results line with (Houglum, Peggy A, 2016) that the most children use plyometric activities every day activities such as running, jumping, hopping, and skipping. Where Recently, most athletes, including soccer players, have undertaken plyometric work through jump training (Greg Gatz , 2009).

In addition, the similar studies according to (Benítez Sillero, J.D.; Da Silva-Grigoletto, M.E.; Muñoz Herrera, E.; Morente Montero, A. yGuillén del Castillo, M, 2015) confirm that the players displayed a significant increase of height in SJ and in CMJ with age where (Nedeljkovic, A., Mirkov, D. M., Kukolj, M., Ugarkovic, D. & Jaric, S, 2007) confirm that the performance in these tests increase with age training categories from U12s to U17s in both tests. Where The positive effects of plyometric training on vertical jump performance are well documented and are generally attributed to both mechanical and neurophysiological adaptations, affecting the efficiency of the SSC. (Sean P. Sankey, Paul A. Jones and Theodoros M. Bampouras, 2008).

## Conclusion

Studies show that plyometric training has positive effects on a number of performance attributes in 10- to 13-year-old children (Urs Granacher, Melanie Lesinski, Dirk Büsch, Thomas Muehlbauer, Olaf

Prieske, Christian Puta, Albert Gollhofer, and David G. Behm, 2016). Where in greater vertical jump ability increases compared with traditional weight training, plyometric training, or isometric training according to (Fleck, Steven J., Kraemer, William, 2014). Thereof, the Children have traditionally been advised against performing plyometric training (Jonathan C. Reeser, Roald Bahr, 2008) thing confirmed by (Joan Pagano, 2013) that watched kids when they are engaged in active outdoor play, dusting that they are familiar with plyometrics. From the above we agree that Explosive leg power is a key ingredient to maximizing vertical jump performance (Nahdiya Zainal Abidin and Mohd Bakri Adam, 2013) as well that Exercise physiologists have shown that power is related to bone development in children and teens and offers health (Nick Draper, Helen Marshall, 2014).

However, recent evidence suggests that when performed properly and progressively with good supervision, plyometrics can be safe (Corbin, Chuck B., Le Masurier, Guy, 2014) thing confirmed by the American College of Sports Medicine (ACSM) supports the efficacy and safety of plyometric training for children (David J. Magee, William S. Quillen, James E. Zachazewski, 2015) where (Solomon Sr. Abrahames, 2013) confirms that Plyometric training programmes have been shown to be effective during puberty for improving running speed and jumps. In summary, as our results the pubescent athletes can engage in low- to medium-intensity plyometrics, although it is critical that they have strength and the coordination to tolerate these drills safely without increasing injuries (James Rheuben Andrews, Gary L. Harrelson, Kevin E. Wilk, 2012).

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### **Correspondent Author**

#### **Zerf Mohammed**

*Physical and Sports Education Institute Mostaganem, Sports Training department laboratory OPAPS, University Abdel Hamid Ibn Badis Mostaganem, 2700 Algeria<sup>1</sup>*

E-mail addresses: [biomeca.zerf@outlook.com](mailto:biomeca.zerf@outlook.com)