

The Effect of Balance Exercises on Some Strength Abilities of The Legs for High-Spiking Players in Volleyball

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ABSTRACT

Background: The purpose of this paper is to identify the effect of balance exercises with different tools on some of the strength capabilities of the two men of volleyball players specialized in high spiking, and it was assumed that there were statistically significant differences in the mentioned abilities between the (pre-post) tests of the mentioned sample.

Method: The researchers used the semi-arbitrary experimental method with a pre-test and a post-test with a group design, and the sample was selected from the Army Club season (2021-2022) and numbered (6) players specialized in high spiking representing 100% of the hitters, and the statistical program (SPSS) was used to extract the mean (Mean), standard deviation (SD), Skewness, (T test) for the correlated samples.

Results and conclusions: They concluded that the applied exercises affected the speed-distinguishing strength of the two men at a better level than their impact on the explosive force.

Keywords: static balance, dynamic balance, explosive power.

INTRODUCTION

Most of the exercises for developing muscle strength have a known direction, and this leads to the regularity of the instructions towards the specified direction. But in balance exercises and because of the anxiety of the base of support, the instructions were not known in the direction, and the instructions were mobilized at the highest speed after the kinetic action, and the body works to respond accordingly to adjust its direction. And this was similar to the difference between the known reaction and the kinetic response whose direction is unknown except after the issuance of the instruction. This might be one of the most prominent features of balance exercises from other exercises, especially in the development of strength. This lead to a positive outcome in improving the player's movements, as it is not limited to strength, but includes performance as well. Balance is of great importance because it was an integral part of all leg movements ⁽¹⁾.

Possession of the player's balance reflects the appearance of his superiority over his peers, and it is one of the qualities of superior players. It has been shown that elite athletes possess a superior balance of power over their less efficient counterparts ^(2,3).

In addition, having the ability to balance in a distinctive way gives preference to developing other capabilities. Balance affects kinetic responses and the athlete's ability to perceive, pay attention and focus ⁽⁴⁾. The game of volleyball, is witnessing a remarkable and continuous development at the level of skillful and physical performance. And we mentioned in particular the skill of spiking, as this skill exceeded its outstanding performance in terms of jump height, strength, control, fluidity, and coordinated movement of body parts by some international players to levels far from the players of our teams, which is considered one of the difficult skills in the game.

The fact that the player performs the main part of the skill while he is in the air, and the player is governed by the nature of the numbers represented by the location of the ball in the air and its proximity or distance from the net and the blocking wall. In addition to that it was considered the basic offensive technical skill to score points and thus achieve victory in the match. Therefore, the importance of the research lies in what the researchers want to develop, which is the strength of the two legs and the skillful performance of spiking. It was found that adding balance exercises to the training units resulted in improvements in vertical jumping, agility, and some other abilities ^(5,6).

And through the experience of the two researchers in the field of volleyball as well as their practice of training it, they noticed that balance exercises in all their forms were not used within the training units in an organized and follow-up linger by the coaches even at the level of the national teams of the game and clubs. Not to mention the auxiliary tools for it, and if used, it was purely coincidental and did not take its importance and full training time to know its impact.

And when reviewing most international studies and sources, we found its multiple uses and its role in developing the physical and skillful abilities of volleyball and various other games. Balance exercises work directly in improving the resulting strength of the player by reducing the proportions of muscles allocated to achieve stability and allowing them to contribute more driving force. performance in decentralized contractions such as a counter or repetitive jumps ⁽⁷⁾.

It represents the problem of the players in the critical stages of performance of the skill, and on the basis of this, the researchers aimed to identify the effect of balance exercises with different tools on some of the strength capabilities of the two men of the volleyball players who specialize in high spiking, and they

assumed that there were statistically significant differences in the capabilities mentioned between the test (pre-post) in the said sample.

Ethical consent:

Informed consent was taken from the player's relatives or the player himself when he was still conscious with keeping the players' records confidential in all stages of the study. The study was approved by the Ethics Board of University of Baghdad.

MATERIALS AND METHODS

The researchers used the semi-arbitrary experimental method with a pre-test and post-test with group design, and the sample was selected from the Army Club season (2021-2022) AD, and they numbered (6) players specialized in high spiking, representing (100%) of the hitters. (\bar{x} - 25.167 years, $n \pm 2.143$, with a skewness coefficient of (-0.137), in training age (\bar{x} 11.667 years, $n \pm 1.480$, with a skewness coefficient of -1.318), in height (\bar{x} -1.930 m, $n \pm 0.017$, with a skewness coefficient of (-1.153), and in the mass body (\bar{x} -83.833 kg, $p \pm 4.956$, with a modulus of skewness (-1.093). The (Time. It) system was used, as a medical balance to measure mass and height, and

various tools for balance exercises with discs weighing (5) kg, number (12) and rubber ropes.

Strength tests for the two men ⁽⁸⁾:

It was measured through the (Time-It) system, and it consists of a special mat for the device that was spread on the ground and a cable connected to a control panel, where the tester stands on it and performs the required jumping method, and then returns after the flight period to the same mat placed on the ground, where the test result is recorded according to what is available On the device screen:

- Vertical jump test with both legs by fixing and swinging the arms (explosive power).
- Vertical jump test with one leg, right and left, by fixing and swinging the arms (explosive power).
- Bouncing jump test (3) consecutive jumps with both legs with swinging arms and recording the result of the final distance (power characterized by speed).
- Bouncing jump test (3) consecutive jumps for each leg with swinging arms and recording the result of the final distance for each of them (power characterized by speed).



Figure (1) Measuring the explosive force of the two legs with the (Time-It) device

Field procedures

After conducting the exploratory experiment, the pre-tests were conducted in the Armenian Clubhall on Wednesday corresponding to (9/29/2021) at (6) pm and lasted (45) minutes.

The set exercises began on Saturday corresponding to (10/2/2021) in the general preparation stage for a period of (8) weeks, at a rate of (3) units per week, with a total of (24) units of unit time (22) minutes from the main section, and according to the clubs' training timings.

All of them are implemented on the tools used, as times, weights, rubber ropes, changing the distance of the base of support and heights, or when performing on one leg were taken as a criterion for the difficulty of the exercises and units, and the diversity of work between the movement of the two legs and the use of exercises

for the arms with combined movements that include the two legs.

As for the time of the exercises on the tools, they were divided (40) seconds (60) seconds to (120) seconds as a maximum, and the total time for the exercises of the (24) units for work and rest periods was (528) minutes, and the work periods were distributed in relation to rest at a rate of (2.65-1), and thus the total percentage of the total real work (384) minutes. Post-test were conducted on Thursday corresponding to (11/25/2021) at (6) pm and took (40) minutes in the same hall.

Statistical methods

The search data was processed through the Statistical Package for the Social Sciences (SPSS).

RESULTS

Table (1) the pretest and posttest differences values for the two legs strength tests

variables	Tests	Arithmetic mean	Standard deviation	Sig
strength left leg	Pre	0.210	0.014	0.310
	Post	0.230	0.042	
strength Right leg	Pre	0.207	0.008	0.221
	Post	0.220	0.017	
Two legs without swinging	Pre	0.452	0.042	0.182
	Post	0.473	0.028	
A leg left swinging	Pre	0.273	0.027	0.102
	Post	0.280	0.028	
A leg right Swinging	Pre	0.247	0.023	0.175
	Post	0.290	0.066	
Two legs with swinging	Pre	0.547	0.014	0.002
	Post	0.572	0.016	
jumps Swinging left (3)	Pre	0.700	0.031	0.143
	Post	0.745	0.062	
jumps Swinging right (3)	Pre	0.685	0.066	0.005
	Post	0.723	0.056	
jumps Two men swinging (3)	Pre	1.48	0.018	0.008
	Post	1.59	0.074	

Degree of freedom = 5 ... significant at (Sig) < (0.050).

From Table (1) it appears: There are three variables that showed significant differences in the post test, namely, the explosive power of jumping with both legs with swinging the arms increased by (4.57%) meters, the power characteristic of the speed of the right leg in the test (3) successive jumps with the right leg without swinging the arms increased by (5.55%) meters, and the power characteristic of the speed of the two legs in the test (3) successive jumps with the legs without swinging the arms increased by (7.43%) meters.

The rest of the variables did not show significant differences in the results of their tests, but they showed a significant increase in the results of their arithmetic mean for their post-tests, as they reached (9.52%) meters in the explosive power of the left leg, (6.28%) of the right leg, and (4.65%) of the two men without swinging the arms.

And for the left-handed legs with the swing of the arms (2.56%) meters, and for the right-handed legs with the swing of the arms (17.41%) meters, and in the strength distinguished by speed for the left-handed legs with (3) consecutive jumps (6.43%) meters.

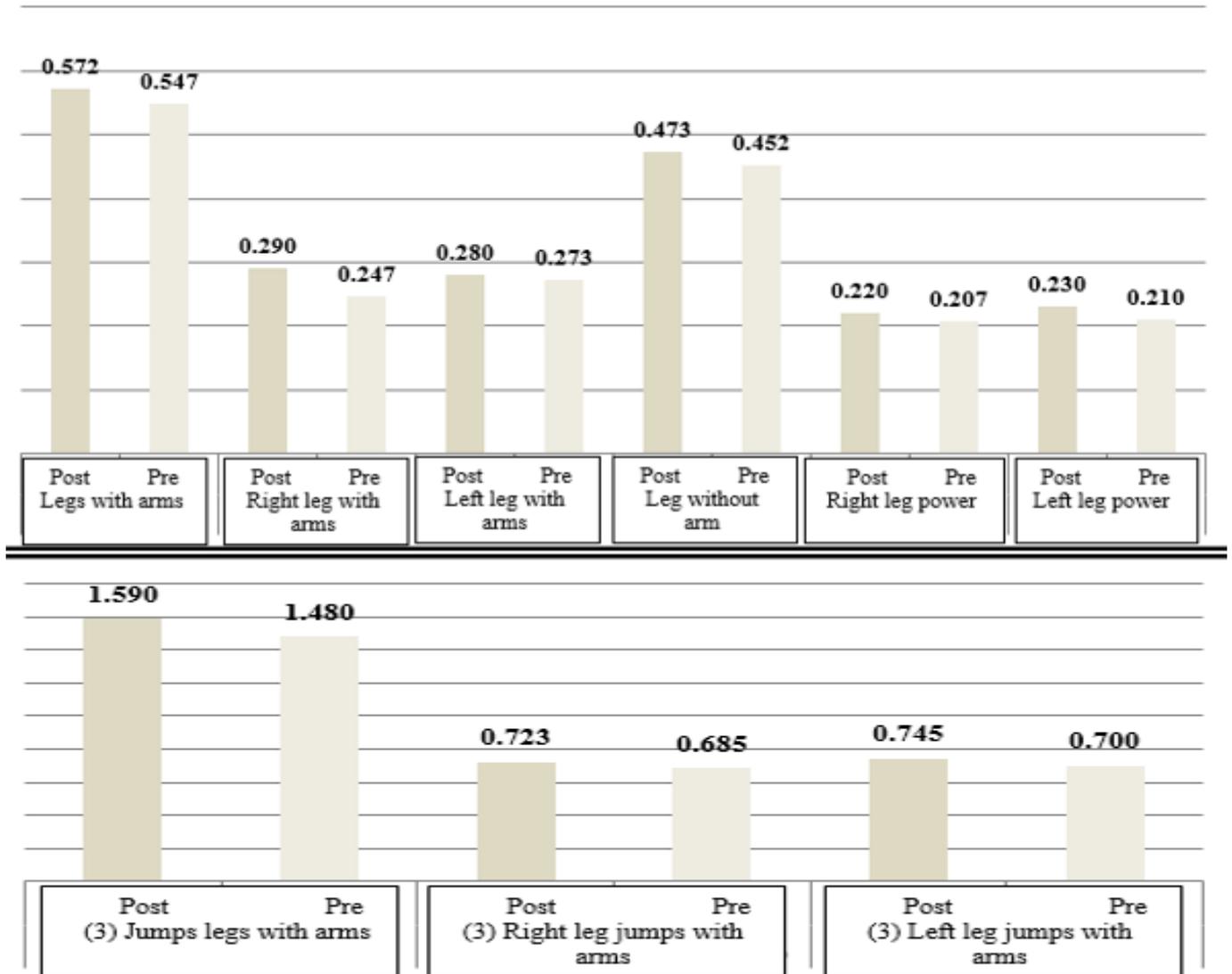


Figure 2: Pre- and post-test values for the two legs strength tests

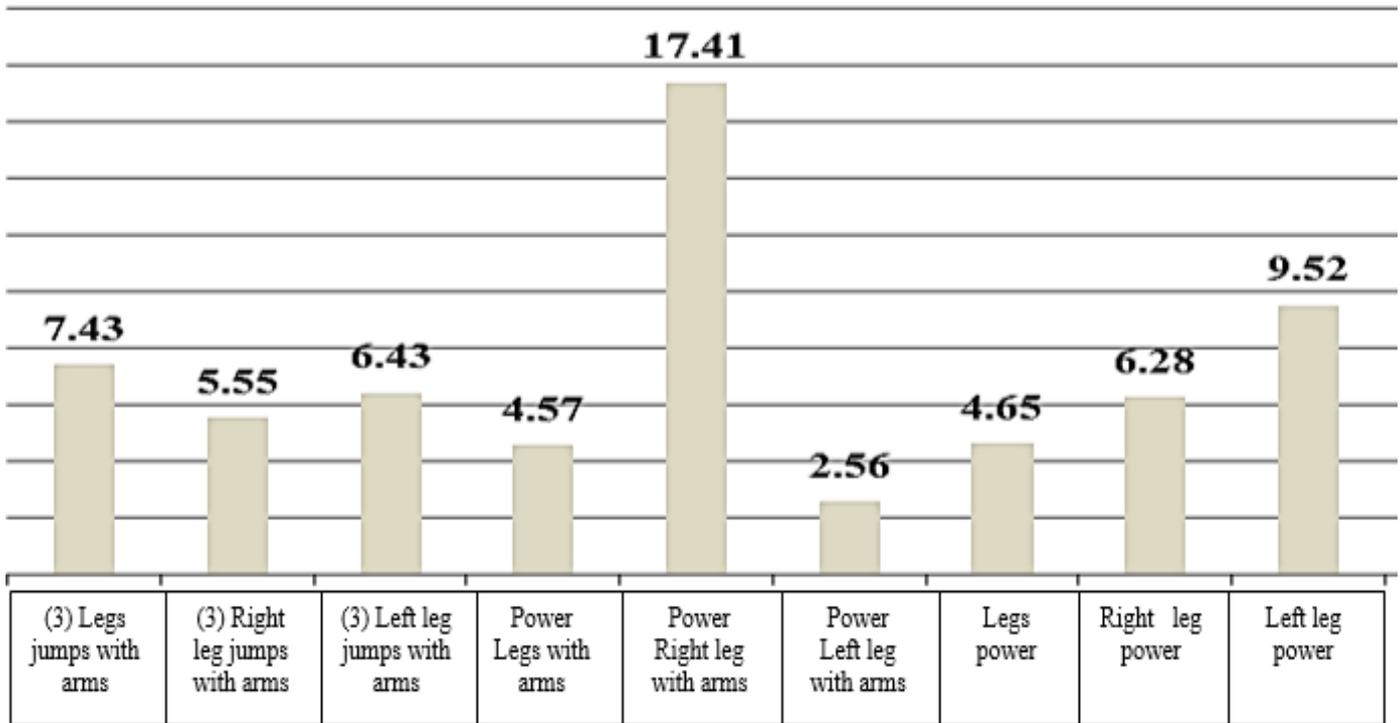


Figure 3: Increased percentages of strength tests for the legs in the post-test.

DISCUSSION

It is clear from the results that the balance exercises were effective in the capabilities of the explosive force and the strength characteristic of the speed of the two men with the movement of the arms to some extent. The strength of the legs and the ability to jump in this game was the decisive factor for winning in most of the conditions of the game in addition to other abilities, as the vertical jump and the power of speed and agility were crucial in the components of the game of volleyball ⁽⁹⁾.

The characteristics of the game, its area, controlling the ball's paths, and making decisions in very short periods added difficulties to the player and require him to possess different abilities at a very high level. The player who was able to produce a larger jump increases his ability to perform successfully in attack and defense due to its pitch, and volleyball requires very short races and fast and agile movements for successful performance ^{(10),(11)}. The measures taken in the variety of jumping tests using the devices allowed the researchers to identify details of the strength at a greater level to find out more details in the advantages of jumping ability and agility, as well as the strength of the arms, which we always find there were good jumping capabilities, but weakness in the player's strikes to the opponent's arena. The volleyball player was directly affected by the ability to produce strength in jumping, arm strength, agility, and rapid repetitive movements. Therefore, different forms of jumps were used to evaluate the strength of jumping (unilateral,

bilateral, vertical, and horizontal) using different measuring devices. It gave a more analytical approach, and we could evaluate these capabilities in all aspects and more complex forms of performance testing ^(12,13). It provided a more detailed view of the neuromuscular capacity of the athlete and thus provided the opportunity to find more modern means to improve training ⁽¹⁴⁾.

Also, the development in the strength distinguished by speed cannot be attributed only to the improvement of the players due to the exercises set, but this characteristic allowed for greater differences between the tests at a greater level than the explosive force tests, although there was a development in the explosive strength of the two men with swinging the arms, and the researchers believed that there was a mutual and fundamental relationship between my ability to balance and the strength of the legs. Balance exercises work to increase the strength of the muscles and joints. Weakness of strength lead to weakness of balance and control of parts of the body during difficult movements, especially as strength is the basis of the work of most games, but in varying proportions even in the one game over which the playing centers were distributed, and this was what we found in the ball. The plane, where the performance of the spiking skill took a large part of the explosive force with the two legs, along with the rest of the parts. If we knew that volleyball players, on average, carry out (250-300) attempts of different performance that were

characterized by explosive power in one game, and half of these measures were vertical jumps⁽¹⁵⁾.

At the end, the researchers found that the experience of the study in general proved the weakness of the players with the abilities studied through the field experiment during the application of the tests on the (Time-it) rug, so there were several attempts to control the movement of jumping and landing on the rug, as most of the players' attempts at its beginning were characterized by incorrect landing after Jumping either with the foot or part of it coming out of the rug. And the most difficult thing to control the movement was jumping with one leg, which indicates a lack of compatibility between the movement and the body of the player. In addition, this weakness might be attributed to their low balance ability due to the lack of focus on training in daily units on modern training tools and means to develop this ability. This was a fact that must be faced and addressed with modern scientific methods that elevated our clubs and their players to international levels through the awareness of coaches and the player too.

CONCLUSION

The applied exercises affected the strength of the two legs with a better level than their impact on the explosive force, so the working time in one exercise was proportional to the ability of this characteristic, and in order to develop the explosive force, it was preferable to use larger weights and work in a shorter time for one exercise. The researchers recommended the importance of using balance tools in all their forms during the volleyball training units because of their great impact on the development of physical variables. And emphasizing the use of balance exercises in the general and special preparation phases, and giving them enough time for training, especially in the warm-up period, because of their importance at the level of the player in the next (main) period of the exercise, and the need to combine strength training and balance exercises during the training units to reach the best results. The desired training and the use of balance tools in exercises for other age groups that include both males and females.

Conflict of interest: The authors declare no conflict of interest.

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REFERENCES

1. **Memisevic H, Mahmutovic I, Pasalic A, Biscevic I (2017):** The effects of age and gender on finger tapping speed in preschool children. *Acta Neuropsychol.*, 15(1):55-62. doi:10.5604/12321966.1237450
2. **Paillard T, Noé F (2006):** Effect of expertise and visual contribution on postural control in soccer. *Scand J. Med. Sci. Sport.*, 16(5):345-348. doi:10.1111/j.1600-0838.2005.00502.x
3. **Paillard T, Noé F, Rivière T et al. (2006):** Postural performance and strategy in the unipedal stance of soccer players at different levels of competition. *J. Athl. Train.*, 41(2):172-176.
4. **Sell T, Tsai Y, Smoliga J et al. (2007):** Strength, flexibility, and balance characteristics of highly proficient golfers. *J. Strength Cond. Res.*, 21(4):1166-1171. doi:10.1519/R-21826.1
5. **Salaj S, Milanović D, Jukic I (2011):** the Effects of Proprioceptive Training on Agility and Balance in Netball. *Kinesiology.*, 39(2):131-141. <http://hdl.handle.net/10369/3583>
6. **Yaggie J, Campbell B (2006):** Effects of balance training on selected skills. *J. Strength Cond. Res.*, 20(2):422-428. doi:10.1519/R-17294.1
7. **Kean C, Behm D, Young W (2006):** Fixed foot balance training increases rectus femoris activation during landing and jump height in recreationally active women. *J. Sport Sci. Med.*, 5(1):138-148.
8. **Yu Y, Reckhow D (2015):** Kinetic Analysis of Haloacetonitrile Stability in Drinking Waters. *Environ Sci. Technol.*, 49(18):11028-11036. doi:10.1021/acs.est.5b02772
9. **Giatsis G (2001):** Jumping quality and quantitative analysis of beach volleyball game. *9th Int Congr. Phys. Educ. Sport.* Published online, 95. <http://ci.nii.ac.jp/naid/10017167752/en/>
10. **Forthomme B, Croisier J, Ciccarone G et al. (2005):** Factors correlated with volleyball spike velocity. *Am. J. Sports Med.*, 33(10):1513-1519. doi:10.1177/0363546505274935
11. **Cengizel E (2020):** The relationship between speed and isokinetic knee strength in female volleyball players. *African Educ. Res J.*, 8(2):406-409. doi:10.30918/aerj.82.20.090
12. **Sheppard J, Young W (2006):** Agility literature review: Classifications, training and testing. *J. Sports Sci.*, 24(9):919-932. doi:10.1080/02640410500457109
13. **Sattler T, Sekulić D, Spasić M et al. (2015):** Analysis of the Association between Motor and Anthropometric Variables with Change of Direction Speed and Reactive Agility Performance. *J. Hum. Kinet.*, 47(1):137-145. doi:10.1515/hukin-2015-0069
14. **Nimphius S, Callaghan S, Bezodis N et al. (2018):** Change of Direction and Agility Tests: Challenging Our Current Measures of Performance. *Strength Cond. J.*, 40(1):26-38. doi:10.1519/SSC.0000000000000309
15. **Mattes K, Wollesen B, Manzer S (2018):** Asymmetries of maximum trunk, hand, and leg strength in comparison to volleyball and fitness athletes. *J. Strength Cond. Res.*, 32(1):57-65. doi:10.1519/JSC.0000000000002183