

## The Effect of Training on Sand on Muscular Power, Legs Tolerance, Various Defensive Movements, and Lactic Acid of Handball Players

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### Abstract:

The current study aims to develop muscular power and legs tolerance, defensive movements and lactic acid of handball players through using training on sand as a type of resistance training to reach the development of lactic acid that serve these abilities and develop their performance of various defensive movements of handball players. The researchers see that training on sand is one of the easy methods of training that prepares and restores the body ability of direct control help to raise the ability of the muscles on their full stretch in addition to enhance player's efficiency physiologically. In order to achieve the study objective, Al-saniyah handball club adult (18) players are selected. The players' heights are (181.2±5.674 cm), weights (75±4.872 kg) and ages (22.3±3.982 years). The players are divided into two groups, (9) players for each group. The first experimental group is given special training exercises on sand and prepared by researchers for (8) weeks and (3 units) per week with an intervention in the main part of the training unit. The second control group adheres to the training course prepared by the coach of the club. After the series of measures, it is concluded that the exercise prepared by the researchers can be adopted to develop the muscular power, legs tolerance and defensive movements in addition to lactic acid for handball players.

Keywords: training on training, handball players, lactic acid

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### Introduction:

The science of sport training is related to physiology closely, which represent the right and essential and effective base of great importance for the development of the sport level if it is built up on sound and scientific fundamentals that concomitant with the individual's vital organs, and abilities to achieve the training objectives. Since handball game requires a special physical and skills capacity, and it is one of the team games in which the energy is released based on the anaerobic lactic system, so much of remains resulted from the lack of energy of the body muscles including lactic acid. It is necessary to establish training programs that observe the continuity of the player's performance without early fatigue caused by lactic acid. In order to affect positively muscular power and legs tolerance, defensive movements, and lactic acid, the physical level should be raised to the required level of physiological development, which leads to increase burdens on the player's shoulders. The fact that these burdens motivate the players to exert more physical efforts through internal resistance to face these burdens in similar circumstances of various defensive movements and develop muscular power and legs tolerance, which in turn increase the players' abilities to perform these various defensive movements. The sand resistance enhances and improves the player's physical and skill levels. Moreover, it improves the imbalance between the different muscular groups, improves the process of powers transference, and the mechanics of the foot joint [1].

The present study aims at developing muscular power, legs tolerance, defensive movements and lactic acid of handball players through using training on sand as a type of resistance training to reach the development of lactic acid that serves these abilities and develop their performance of various defensive movements. The researchers see

that training on sand is one of the easy training methods that prepares and restores the body the ability to control muscular abilities and helps directly to raise muscular abilities to fully extend and increase the player's ability physiologically. The use of " resistance exercises will develop muscular power of legs by jump drills, and body weight resistance that leads to the development of muscular power and other physical requirements"[2].

The study problem discusses fatigue results from performance and energy production remains, the anaerobic system (lactic acid) in particular, which is one of the most influential systems of energy production in the muscle cells. The focus on energy production systems during muscular power training, legs tolerance, and defensive movements of handball helps accelerating the player's performance efficiency and ability by developing the function of body organs.

The study hypothesis is to create a positive effect of the training method on the variables (under study) of the handball players.

**Methodology:**

The study methodology: The two researchers identified the experimental approach to solve the study problem and achieve its objectives.

**The Study Population:**

The researchers identified the study population as (21) adult players of Al-saniyah handball club for (2017-2018) , where the goalkeeper is excluded. The net number of the sample is (18). The researchers use simple random sample to divide it into two groups (9) players for each group. The first experimental group is given the training drills on sand that prepared by the researchers. The second control group has applied the training programme prepared by the coach. The players' heights are (181.2±5.674 cm), weights (75±4.872 kg) and ages (22.3±3.982 years).

**The Study Tools and Equipment:**

(Arabic and foreign sources and references- sand court- handball court - measuring tape-chalk, (3m) wall- Stopwatch- whistle- hurdling (50 cm) height- Adhesive tape-lactic Prom meter-lactic acid book)

**The study tests:**

- 1-Test of standing vertical jump to measure legs muscular power [3].
2. Test of standing broad jump to measure legs muscular power [3].
- 3-Test of quadruple jump in (10 seconds) to measure legs muscular power . A square area 2X2 with two crossing lines and the angle is 90 degree. The jump area is divided into four equal areas then numbered (1, 2,3 and 4) with different colors. The lab. degree is calculated the number feet touch thecorrect and defined areas[4].
4. test of half- squat jump and the knees are half- bent until exhaust efforts to measure the legs tolerance, Unit of measure (number of times) [2].
- 5-Test of diverse defensive movements with the direction change to measure the performance speed of defensive movements for the side, forward, and backward then repeat the same attempt but with the direction change within (30 seconds). The lab. degree is calculated through the correct attempts [5] .

**PRE- TEST:**

Day 1: The first is Monday, 7<sup>th</sup> Aug. 2017 at 4 pm in Rahim Abbas Hall / Al-Qadisiyah Governorate, the tests of muscular power and legs tolerance are conducted, and sufficient rest is given during tests.

Day 2: The second day is Tuesday 8<sup>th</sup> Aug. 2017 at 9:00 am at Rahim Abbas Hall/ Al-Qadissiyah Governorate to measure blood lactic acid using lactic meter as shown below. The sterile alcohol is applied on the athlete's thumb then special needle is injected on strip test to read the result after 60 seconds as shown figures (1-2). Before performing any effort, players are in complete rest or any physical effort or eating any food or drink before 12 hours of the test. Then, warm-up starts and test of defensive movements with a direction change of handball.



Figure (1) blood lactic acid meter

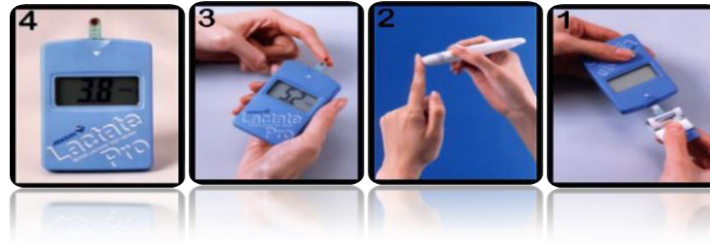


Figure 2 the steps to get a blood sample for lactic acid test

After the test, the measurement was carried out in the post-effort period (5 minutes) following the same pre-procedures.

**Exercises using Sand Training:**

Intensity: (70-90%), repetition (4-7), sets (2-3), rest between repetitions, the Pulse should be 120 - 130 B/M, rest between sets (3 Min.), duration (8 weeks), units (3 units per week). The intervention is in the main part, the method is high intensity training).

**POST- TEST:** The post- test is performed on (Tuesday-Wednesday), 10<sup>th</sup> -11<sup>th</sup> Oct. 2017, the same conditions are observed as in the pre- test.

**Statistical tools:**

Researchers used SPSS to deduce the value of Wilcoxon and the value of Mann Whitney.

**Results:**

Table (1)

Muscular power tests, legs tolerance, defensive movements, and lactic acid for pre and post- tests for the experimental and control groups.

	Group 1					Group 2				
	Before		After			Before		After		
Description	Mean	SD	Mean	SD	P	Mean	SD	Mean	SD	P
vertical Jump	40.89	3.26	56.11	2.57	<0.05	38.67	3.61	45.56	4.64	<0.05
Broad Jump	199.78	9.56	244.33	12.07	<0.05	197.78	8.07	218.22	7.71	<0.05
quad jump	20.22	1.39	31.89	1.76	<0.05	19.89	1.45	25.89	1.05	<0.05
Power tolerance	29.44	1.51	49.00	2.12	<0.05	28.44	1.88	39.11	1.69	<0.05
Defensive movements	46.56	6.02	73.22	1.86	<0.05	45.56	5.41	62.22	2.39	<0.05
pre-test LA	1.58	0.17	15.89	0.78	<0.05	1.69	0.16	16.11	0.78	<0.05
Post –test LA	1.44	0.17	12.91	0.34	<0.05	1.61	0.13	14.41	0.49	<0.05

Table 1 shows the means, standard deviations, and the calculated Wilcoxon value for the results of the muscular power tests, legs tolerance, defensive movements, and lactic acid, and pre- and post- test of first experimental group and the second control one. Since the significance level is less than (0.05), the difference is significant between the pre- and post-tests and in favor of the post- test of the two groups.

Table (2)

Muscular power, legs tolerance, defensive movements, and post-test lactic acid tests for the experimental and control groups.

Description	Group 1		Group 2		P
	Mean	SD	Mean	SD	
vertical Jump	56.11	2.57	45.56	4.64	<0.05
broad Jump	244.33	12.07	218.22	7.71	<0.05
quad jump	31.89	1.76	25.89	1.05	<0.05
Force tolerance	49.00	2.12	39.11	1.69	<0.05
Defensive movements	73.22	1.86	62.22	2.39	<0.05
LA	12.91	0.34	14.41	0.49	<0.05

Table (2) shows the means, standard deviations, Mann Whitney calculated value for the results of the muscular power, legs tolerance, defensive movements and the post-test lactic acid tests of the experimental and control groups. Since the significance level is less than (0.05) so the difference is significant and in favor of the test of the first experimental group.

### Discussion:

Tables (1) and (2) show the means, standard deviations, Wilcoxon, and Mann Whitney values for the results of the muscular power tests, legs tolerance, the various defensive movements and lactic acid of Al-Saniyah handball club of the experimental and the control groups. In respect to the differences between the two groups, the results are in favor of the first experimental group that used exercises of training on sand.

The researchers attribute these differences between the experimental and control groups of muscular power tests and the tolerance of pre- and post-tests to the employment of training on sand. The training process depends on its organization so it creates a kind of development of players' performance level due to the drills conformity with the sample abilities (experimental group). As a result, positive improvement appears during training, which relates each exercise to muscular power and legs tolerance with various defensive movements.

It is necessary as seen by the researchers that the players should have the muscular power, which gives them the ability to use their physical abilities its role in mastering various defensive movements. Therefore, coaches resort to employ sandy lands to develop physical abilities as a different environment in addition to its accessibility that achieves positive impacts on the players' [6]. The increase of resistance of sand improves the player's physical and skill levels. The real importance is manifested in the improvement of the imbalance among the different muscular groups, and the process of transferring powers and mechanical movement of the foot joint [7].

The size of work exerted on the sand differs from the size of work exerted on the surface solid (ground) and grassland due to the different degree of resistance that the player faces. Moreover, the exercises on the sand is used as a type of resistance to strengthen the legs muscles and increases legs muscular power. The reason is that sand surfaces lack consistency of its grains, which makes movement difficult and needs to exert greater effort by the players. Also, the training on sand surfaces strengthen tolerance element. The importance of tolerance strength lies in its role as being one of the physical abilities that plays a significant role in maintaining a steady level of performance in handball [8]. There is no doubt that handball player required to exert a great and continuous efforts along the match time and maintains various defensive movements. The player has to conclude the match in a physical situation similar to the beginning. Hence, trainers resort to use physical exercise especially jumping and prancing exercises as part of the training program on sand to improve physical abilities as a different way, which achieves positive sides in the players' training [9].

The researchers attribute the development of various defensive movements to the exercises used in the study that add and improve to their performance. Thus, the success of any method is through emphasizing the use of scientific methods to develop these skills. This is confirmed by the (Mufti) "the training process has various aspects of physical and skills preparation and as the players have high physical abilities may help them in the rapid skills development"[10]. The development of muscular power, legs tolerance have improved various defensive movements, which performed powerfully and rapidly.

The tables revealed that the lactic acid concentration before and after test, and before the exercises are in favor of post-test measurement for the two groups. Also, the same result after the test after exercises is in favor for the first

experimental group. The results reveal that the use of exercises of training on sand that prepared by the researchers has an important role as a vital regulator of hydrogen ions to delay the muscular fatigue resulting from training. Consequently, its effects on the muscular ability and legs tolerance and to continuous various defensive movements with the existence of acid lactic acid through transferring hydrogen ions and the elimination of acidity. The experts of training sports agree that the physical and physiological adaptations are due to the athlete's organized training programmers [11].

The increase of lactic acid in blood of swimmers after the performance is an indicator that the players are able to endure pain resulted from increasing lactic acid in blood. The generated energy from anaerobic breaking of glucose is high as seen through high concentration lactic acid in blood that makes the players' performance efficient and for longer distances [12].

The researchers attribute the significant differences of the first experimental group after the effort to the concentration of lactic acid and training on sand. The Physiological variables are influenced by athletic training, where training leads to physiological changes in all body organs. The training performance develops as long as these changes are positive to achieve physiological adaptation of the body organs to perform muscular power and diverse defensive movements with high efficiency and economy of efforts [13].

The researchers have confirmed that sports training is the effective way to develop all athletic body organs due to the continuous and regular training. The researchers attribute the significant differences to the impact of the exercises they have prepared with different physical loads. They stated that the differences that appeared in the tables are results to the improvement of muscular power level, various defensive movements, which affected the players' lactic acid concentration the (study sample). The researchers also attribute the development of muscular power, legs tolerance, various defensive movements, and lactic acid to the spans of time and training method of the anaerobic energy system that improves the players' functional efficiency or work with the lack of oxygen and without sufficient rest that makes playing with lactic acid fast with maximum strength [14].

The researchers attribute the development of the second control group to the continuity and adherence to the training programme that prepared by the coach and the application its exercises, which leads to the players' development of the control group.

#### **CONCLUSIONS:**

1. The exercises prepared by the researchers have a positive effect on the development of muscular power, legs tolerance, defensive movements and lactic acid of the handball players.
- 2-There are significant differences between the group that trained on the sandy land and between the group that trained on the leveled ground(tartan) in favor for first experimental group in all the study variables.
3. The used exercises have achieved the study objectives to develop muscular power and legs tolerance, defensive movements and lactic acid of the handball players.

#### **RECOMMENDATIONS:**

-We recommend coaches to use training on sand because of their impact on the development of muscular power and legs,defensive movements and lactic acid of the handball players.

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