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The Effect of Training Methods whichUse Free Weights and Lifting Machines on the Development of Speed, Strength and Anaerobic Endurance, as well as Certain Functional Variables for Volleyball Players

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Abstract:
The aims of this research are designing two training methods, namely by using free weights and lifting machines and to identifying the effect of free weight training on the development of strength, speed and anaerobic endurance, as well as certain functional variables of volleyball players. As well as to identifying the effect of training by using lifting machines on the development of strength, speed and anaerobic endurance, as well as certain functional variables of volleyball players. Finally to identifying the differences between the two experimental groups during the posttests, concerning strength, speed and anaerobic endurance, as well as certain functional variables. The adopted method of research here is the experimental method, and the research population consists of twelve volleyball players of the Industrial Sport Club. The players were divided into two experimental groups. The results were shown, discussed and analyzed after performing the required statistical processes. In conclusion, training methods which use free weights and lifting machines resulted in the improvement of the speed, strength and anaerobic endurance, as well as certain functional variables. The experimental method of research which has been adopted had a positive and effective influence on the development of speed, strength and anaerobic endurance, as well as certain functional variables.

Keyword: Free Weights, Lifting Machines, Speed, Strength, Anaerobic Endurance, Volleyball.

1. Introduction

1.1: Research Introduction and its Significance:

Volleyball has become an entertaining and slightly game to watch, as a consequent of the quick development over the past few years. This development is gained by broadening the players' physical and tactical abilities. This lead to the enhancement of their strategical and skill-related performance, which eventually required augmenting certain rules of the game of volleyball itself. Progressing to more advanced levels of game is one of the main concerns of sport dedication. Superiority in sport is considered to be a result of training certain people who are privileged with specific physical, tactical and strategical abilities, and are distinguished from others by mastering this ability which enables them of realizing the greatest achievements. This sport training depends on science and experiments, and it is considered to be the ideal way for sporters to reach the required level that qualifies them to take part in championships and competitions. This is done by coaching these sporters, depending on a plan that consists of various overlapping types of trainings, inter alia in physical, tactical, psychological and functional terms.

Volleyball is a sport that consists of various skills. Therefore, it requires a systematic training plan which coordinates between these skills and the player's physical abilities (each skill requires its own ability). This points out the importance of this research, namely identifying the body's endurances during training processes, and their role in enhancing physical and tactical abilities. In modern sport training, the volleyball player's movement, which is described as altering in its intensity of muscular activity, should be taken into consideration. Even though the basic volleyball skills seem to be very simple, yet, performing and mastering them requires a great effort due to the strict rules of the game. (The ball should be touched for as a short time as possible; the ball shouldn't touch the ground; each team is allowed to touch the ball three times only; the court is relatively small.)

Muscular strength can be developed by increasing the amount of weight during the exercises. Weight trainings are considered to be an important element that contributes to the enhancement of the player's physical fitness in volleyball. "Weight training increases the body's strength, as well as the explosive abilities of the upper and lower part of the body."

Coordinated sport training is a mean to realize more advanced levels of performance in case all other appropriate circumstances are available (like the player's abilities and capabilities, as well as other features). Therefore, to affect the sporter's physical, tactical and functional level of performance, the lights should be shed on the adopted training method, which plays an essential role. "Training methods result in physical and functional adaptations of the player, which play a crucial role in the enhancement of achievements." As is known, volleyball is a sport that requires specific physical abilities which enables the players of performing effectively. The level of performance of our local sport clubs is very scarce concerning these skills. The researchers noticed that the players lacked the muscular abilities which are essential in order to perform these basic skills.

The problem of this research is the absence of a scientific training program which includes free weights training and exercises on lifting machines, as well as the lack of essential instruments required for these exercises and trainings.

Therefore, the researchers intended to enhance the players' endurance, maximum strength and their speed force by depending on the two training methods which use free weights as well as lifting machines. The aims of this research are:

1. Designing two training methods, namely by using free weights and lifting machines.
2. Identifying the effect of free weight training on the development of strength, speed and anaerobic endurance, as well as certain functional variables of volleyball players.
3. Identifying the effect of training by using lifting machines on the development of strength, speed and anaerobic endurance, as well as certain functional variables of volleyball players.
4. Identifying the differences between the two experimental groups during the posttests, concerning strength, speed and anaerobic endurance, as well as certain functional variables.

2. Research Method and its Fieldwork Procedure

2.1: Research Method:

The adopted method of research is the experimental method, for it suits the type of problem of this research.

2.2: Research Sample:

The selection of the research sample is an important task which should be done systematically, for it represents the research population. This sample is selected non-randomly from the members of the volleyball team of the Industrial Sport Club (youth-class). The research population consists of 18 participants, and the sample consists of 12 players which were divided into two experimental groups of 6 players. The first experimental group was trained by using the free weights method, while the second experimental group was trained by using lifting machines.The two samples are compatible, as is shown in table (1) and (2).

Table 1 (Shows the specifications of the research sample)

Variables	Mean	Median	Standard Deviation	Skewness
Height	1.75	170	4.71	0.87
Weight	57.18	57	3.7	0.71
Age	16.31	16	0.84	0.39

Table 2 (Shows the compatibility of the research sample)

Tests	First Experim. Group		Second Experim. Group		T Value	Significance Level
	M	SD	M	SD		
Strength endurance test	31.2	6.28	30.89	6.1	0.54	No Sig.
Speed endurance test	28.631	1.024	28.77	1.041	0.68	No Sig.
Anaerobic endurance test	70.551	0.52	71.329	0.481	0.841	No Sig.
Heart rate during lactic rest	81.3	1.21	80.79	1.4	0.733	No Sig.

Vital capacity test	2.9	45.94	2.81	48.96	1.321	No Sig.

2.3: Used Instruments and Devices:

1. Arabic and foreign references
2. Forms for collecting information
3. Tests and measurements
4. Scale and ruler (to measure the participant's weight and height)
5. Lifting machines (Machines consisting of mechanically movable weights of different amounts, which enable the sporter of performing various exercises)

2.4: Used Tests:

1. Strength endurance test
2. Speed endurance test
3. Heart rate during rests
4. Vital capacity test

2.5 Exploratory Experiment:

The mechanism of the lifting machines have been checked on 18/01/2016 by using two research participants, in order to prepare the research samples, to identify their capability of working and performing their tasks, and to avoid the mistakes of previous researchers during similar experiments.

Its purpose is:

1. To find out the time needed to perform the experiment.
2. To make sure that all instruments and devices are working well.
3. To identify the capability of the research samples and their level of adaptation during the experiment.

2.6: Fieldwork Procedure:

2.6.1: Pretests:

The pretests took place on 23/01/2016. The researchers aimed to provide all suitable circumstances (time, place, instruments and adopted experiment method), for this will be useful during the posttests.

2.6.2: Experimental Method:

After finishing the pretests, the researchers applied the principles of the two training methods on the research samples. This occurred during the individual training period. Thesetraining methods were applied as the main part of the training unit. The research sample was divided into two groups, the first experimental group trained by using free weights, and the second experimental group trained by using lifting machines.

These trainings took place during the period between 25/01/2016 and 17/03/2016, for 8 weeks with an average of three training units per week. Each training unit lasted for about 60 to 75 minutes, by using the warming-ups and cooling-downs of the trainer's choice before and after the training unit.

2.6.3: Posttests:

After finishing the principles of the training methods within the assigned period of time, the posttests took place on 19/03/2016. Again, the researchers aimed to commit to the same circumstances of the pretests.

2.7: Statistics:

The following statistical values are used:

1. Mean
2. Median
3. Standard Deviation
4. Skewness
5. T Value for correlated samples

6. T Value for independent samples

3. Analysis and Discussion of Research Results

3.1: Analysis and Discussion of the Results of the Pretests and Posttests for the First Experimental Group:

Table 3 (Shows the mean, standard deviation and the T value for the first experimental group)

Variables	Pretest		Posttest		T Value	Significance Level
	M	SD	M	SD		
Strength endurance test	31.2	6.28	33.67	6.95	4.71	Significant
Speed endurance test	28.631	1.524	27.52	1.67	3.251	Significant
Anaerobic endurance	70.551	0.52	72.61	0.81	3.66	Significant
Vital capacity	290	45.94	310	0.11	4.12	Significant
Heart rate	81.3	1.21	80.79	1.4	3.517	Significant

**Note: The T value for this group is (2.57) with a significance level of (0.05) and a freedom degree of (5).*

Table 3 shows the results of the pretests and posttests for the first experimental group. There is a noticeable difference between the two cases, and the results after applying these exercises appear to be better than before applying them.According to the researcher, this is a consequent of applying these specific exercises, because training by using free weights had an effective influence on the muscle activity. These muscle groups will work according to the amount of weights, intensity and repetition of exercise, fitting the abilities of the participants of the research sample. This had a positive effect on the enhancement of the performance during the periods of trainings. The players' endurance during the training was appropriate and coordinated in such a way that it suited the development of their speed, strength and anaerobic endurance as required. Issam Abdul Khaliq confirmed: "Using endurance trainings will result in the player's adaptation."

These exercises depended on a gradual increase of intensity which helped the muscles to adopt to the new circumstances smoothly, especially by using jumping exercises and others. Important to note is the effect of stretching exercises in all its types, for it enhanced the player's strength and speed (which increase during central muscle tightening).

3.2 Analysis and Discussion of the Results of the Pretests and Posttests for the Second Experimental Group:

Table 4 (Shows the mean, standard deviation and T value for the second experimental group)

Variables	Pretest		Posttest		T Value	Significance Level
	M	SD	M	SD		
Strength endurance tests	30.8	6.1	34.51	6.18	4.28	Significant
Speed endurance test	28.78	1.41	26.33	1.84	3.69	Significant
Anaerobic endurance	71.329	0.874	73.93	0.481	4.13	Significant
Vital capacity	81.39	1.21	19.15	1.378	3.661	Significant
Heart rate	281	48.96	325	52.37	5.91	Significant

**Note: The T value for this group is (2.57) with a significance level of (0.05) and a freedom degree of (5).*

Table 4 shows the results of the pretests and posttests for the second experimental group. There is a noticeable difference between the two cases, and the results after applying these exercises appear to be better than before applying them. According to the researcher, this is a result of the players' individual abilities, as well as the fact that this experimental group has used lifting machines (rather than free weights) which enable the participant to perform various weight exercises. In addition, there seemed to be an effect for the rests taken by the participants during the exercises and repetitions, which were timed according to the heart rate average. ReysanKhuraybit notes: "The rests taken during the training session are determines by the individial's heart rate."

3.3 Analysis and Discussion of the Results of the Posttests of both Experimental Groups:

Table 5 (Shows the mean, standard deviation and T value for both experimental groups)

Variables	First Experim. Group		Second Experim. Group		T value	Significance Level
	M	SD	M	SD		
Strength endurance tests	33.67	6.65	34.51	6.18	3.11	Significant
Speed endurance test	27.52	1.67	26.33	1.84	4.2	Significant
Anaerobic endurance	72.61	0.81	73.93	0.481	3.63	Significant
Vital capacity	310	50.11	325	52.37	3.39	Significant
Heart rate	80.79	1.4	78.33	1.821	4.52	Significant

**Note: The T value for this group is (2.23) with a significance level of (0.05) and a freedom degree of (10).*

Table 5 shows the results of the pretests and posttests, and by observing the means we notice that the second experimental group performed better than the first one. This group trained by using lifting machines, which are considered to be supporting training instruments that suit the preset training method whose positive influence has been proved by means of the experiment results, in addition to the various exercises provided by the machines. As well, using interval training lead to the improvement the players' endurance. Therefore, performing these exercises on a certain level and for a long period of time will reduce the individual's fatigue, and the use of lifting machines had a direct effect on the physiological size of the muscles and eventually increased the muscle's endurance.

4. Conclusions:

Some of the research's conclusions:

1. Training methods which use free weights and lifting machines resulted in the improvement of the speed, strength and anaerobic endurance, as well as certain functional variables.
2. The applied exercises lessen the energy spent during the performance, and thus enhance the kinetic performance and the player's resistance against weariness and muscle spasm.
3. The experimental method of research which has been adopted had a positive and effective influence on the development of speed, strength and anaerobic endurance, as well as certain functional variables.

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