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THE EFFECT OF PLYOMETRIC TRAINING ON THE PHYSICAL READINESS OF FEMALE VOLLEYBALL PLAYERS

Mekhanet Mohamed[1], Chachou Ahmed Ali[1], Mokrani Djamel[2]

[1]*Institute of Science and Technology of Physical and Sports Activities University of Ammar Tliji, Laghouat, Algeria*
[2]*Institute of Physical Education and Sports, University of Mostaganem, Algeria*

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Abstract
The aim of this study is to determine the importance of plyometric training in maintaining the physical readiness of top female volleyball players, as the study sample consisted of 20 f active in the Al-Nour Volleyball Club, Laghouat. In order to identify the extent to which plyometric training contributes to maintaining the physical readiness of volleyball players, we conducted physical tests and applied a training program, as the results of the statistical analysis showed that plyometric training contributes greatly to maintaining the physical readiness of senior volleyball players.
Keywords: sport training, extension and contraction of the working muscle, exercises stretching

INTRODUCTION

The current sports training has known significant progress in several aspects, including the morphological, physiological, physical, psychological and social aspect, and the tactical aspect of volleyball, and this explains the overlap of the various means and strategies that contributed to this development. Among the most important means we find: Medical means, which are the functional devices that allow measuring the physiological variables of the organ system of the athlete's body during effort and during rest in order to facilitate and adjust the training load and retrieval. We also find audio-visual aids: such as observation - and video analysis.

With regard to strategies: we find various technologies and techniques such as the use of computers by trainers to prepare tests and analyze results …. etc. The use of the latter has witnessed great development in most countries of the world, but despite the availability of modern strategies and technologies, reaching the highest level of performance remains "all athletic training should be geared towards high performance" (Weineck, 1997) is not easy due to the presence of some obstacles, including technical and physical.

Plyometric training is a group of exercises that involves stretching the muscle from the contraction position based on lengthening to the position based on the contraction position based on the shortening to produce a movement characterized by high strength in a short time. In order to apply plyometric contraction exercises, which combines concentric and eccentric muscular contractions. As for Alford, he defined it as "a training system designed to develop muscular endurance, in which the general muscle groups first begin to relax under the influence of a certain load before to start the contraction as soon as possible (Alford), 1989 (p21.

Whereas (Moura) defined it as "activities that include a cycle of extension and contraction of the working muscle, which causes its flexibility and works to benefit the muscle from the reflected mechanical energy resulting from the effect of lengthening, which leads to greater strength and speed of performance (Moura, 1988, P31. With regard to central muscle contraction, it is the ability to exert a force during a range of motion that is based on the kinetic (dynamic) method of the nervous muscular system, where the amount of internal force exceeds the external force, provided that muscle contraction in this method is accompanied by a convergence between its origin and its impulse, as it moves The two ends of the muscles are close to each other and the muscles gain volume. It is also called the positive phase; this contraction is the easiest to perform because it occurs when the weight is lifted. On the other hand, this is where we have the least power. In fact, it is easier to hold or release a weight than to lift it. Eccentric muscle contraction, which is the first stage located on the ankle of the muscle, as the muscle fibers are stimulated, and works to lengthen them. And the stage of competition in volleyball is characterized by the multiplicity of matches, this requires repeated promotions.

In volleyball, the vertical rise is the main indicator of performance, and most coaches and athletes rely on plyometric training for the purpose of acquiring muscle contractions that can be employed in various types of advancement for each skill, as stated (Vasil K. Bazanov B., 2012) "It has recently become clear that athletes Those who train in a variety of plyometric exercises result in a significant improvement in vertical

elevation." And (Hamdi Sofiane, 2011) added that plyometric training can cause injuries, as it was relied on with an excessive load during the competition stage.

From this standpoint, the general question revolves around the importance of plyometric development in maintaining physical readiness during the competition stage. And does plyometric exercises (high) affect the physical readiness during the competition? Is the repetition of these exercises in the mini-courses in the competition phase a negative or positive indicator of the physical readiness of volleyball players? Accordingly, the following hypotheses were put forward: the use of plyometric exercises with moderate intensity maintains readiness during the competition stage, and it can be assumed that the repetition of plyometric muscle contractions in the cycle,the mini-represents a negative cycle in maintaining the physical readiness of volleyball players during the competition stage.

MATERIALS AND METHODS

Participants

The study population is represented in the Laghouat volleyball clubs that are active in the first national division B, and the research sample was limited to 20 players from the Al-Nour Volleyball Club, a major class for the 2021/2022 season. The sample was divided into two groups (10 players of the experimental group and 10 players of the control group).

To achieve the objectives of the study, the researcher relied on the field experiment, which was based mainly on morphological measures and physical tests (the strength of the upper limbs, speed of movement and vertical ascent) (Sargent's test), where these basic physical characteristics were chosen as they represent the main indicator of physical readiness. He also proposed a training program that adopts the plyometric training method and includes exercises to develop plyometric contractions

Method for measuring morphological compounds

- Age, height, weight, characteristic arm height, arm height

Method of field tests

- Strength test: throwing a medicine ball
- Speed Continuity Test: (6 x 6 x 5. Special measurement repeat
- Sargent test (vertical ascent)
- Implementing a proposed training program for the periodic technical physical training method

Data Analysis

Statistical methods used in the research are arithmetic mean, standard deviation, T-test for differences

Table 1. Morphological characteristics of the sample

morphology characteristics	age	height	weight	arm height wingspan 1	Arms height wingspan 2
Arithmetic mean	23	179,25	69,91	234,58	232,66

Suggested Training Program

Table 2. Proposed training program

Competition Stage	Mic. 1	Mic. 2	Mic. 3
Classes type and intensity of plyometric training	Class 1 lower members Medium intensity	class 5 lower members medium intensity	class 9 upper members medium intensity
	class 2 lower members	class 6 lower members Max intensity serving	class 10 upper members extreme intensity
	class 3 upper members Medium intensity Serving	class 7 upper members medium intensity	class 11 lower members medium intensity
	class 4 upper members extreme intensity	class 8 upper members extreme intensity	class 12 lower members extreme intensity

RESULTS AND DISCUSSION

First hypothesis "High intensity plyometric exercises affect physical readiness"
We note from Table 3. that the results recorded for the control sample between the pre-test conducted during the pre-competition stage and the post-test conducted during the competition stage were in favor of the post-test for the three physical attributes, where the following results were recorded (Power T = 2.442, Mobility speed t = 2.218, elevation t = 2.117), as for the experimental group, the results were as follows (force t = 2.802, mobility speed t = 2.335, elevation t = 2.782) in favor of the pre-test, and this shows that the classes programmed in the second mini-cycle (mic n°2) was severely high as it affected the results of physical characteristics conducted immediately after the third mini cycle, and this causes excessive fatigue and lactic acid accumulation, which requires at least two weeks of recovery according to Véronique Billat (2003),This, of course, affects the physical readiness during the competition phase.

Table 3. Results of the pre- and post-tests for the two samples between the competition stage and the pre-competition stage

Sample	Mini-course	Physical exams	Pre/post-test	Arithmetic average	Test T-	
Experimental group	Mic. N (:2) (4) High intensity stakes in the	test strength	4.42	4.15	T2.808=	statistically significant
		test speed	7.25	7.16	T2.335=	
		test Rise	50.39	44.94	T2.782=	
The control group,	competition stage	test strength	3.90	4.15	T2.442=	
		test speed	7.56	7.45	T2.218=	
		test Rise	47.26	48.50	T2.117=	

The second hypothesis

The contribution of the proposed training program to the development of basic physical characteristics, which in turn represent the physical readiness of volleyball players during the competition stage.

Through Table 4. which shows the results of the pre and posttest for the control group, where the differences test showed the following results (power t = 2.460, mobility speed t = 2.675, advancement t = 2.329). As for the experimental sample that was subjected to the proposed plyometric program, we notice a development between the pre-test and the second post-test, where the results recorded a rate of development estimated at (53 cm in relation to strength, 39 parts of a second in relation to moving speed, and it was recorded 9.63 cm in relation to vertical ascent, as was the test "T" D in favor of the second post-test, and this explains the importance of plyometric exercises,

As for the physical readiness during the competition stage, whether these exercises are for the upper or lower part of the volleyball players, because most of the skills in them depend on the upscaling and the distinctive strength of speed, whether in the crush, blocking wall or sending the crush, the repetition of these skills depends on high physical readiness and this is what makes The majority of volleyball coaches depend in their preparations on plyometric training, whether it is for strength, jumping, or speed of movement and reaction, and this is what fulfills the hypothesis of the study.

Table 4. View physical exam results

Physical tests	Sample	Pre-test	Post-test "2"	Differences test
strength test	experimental group	4.42	4.95	2.315
	control group	3.90	4.05	2.460
speed test	experimental group	7.25	6.86	2.218
	control group	7.56	7.45	2.675
Rise test	experimental group	50.39	60.02	2.442
	control group	47.26	48.90	2.329

CONCLUSION

The current sports training is a structured and framed training process that contains principles and general foundations in its application to the contents of training programs and methods, and through our study, which is based on the effectiveness of the proposed training program, which mainly includes the plyometric training method, because the latter depends on the interaction of the three central contractions (concentric), (eccentric) and parallel contraction (isometric). Benjamin Dumontier (2020) states that plyometric training is a combination of different systems of muscle contraction eccentric and isometric with the smallest possible time difference between the different phases of these systems (depending on the environment and the tasks to be performed).

In the tribal and remote tests, we also relied on the test of strength in the upper extremities, speed of movement and vertical ascent, which is an important indicator of the physical readiness of female volleyball players, especially in the pre-competition and competition stages. Because the latter is characterized by the succession of competitions. Which requires great physical stress for the skilled technical employment of various tasks

The competition. Physical abilities are considered one of the most important requirements for skill readiness in modern volleyball. Despite the presence of a high level of technicality for the player, we note that the instability of this level during the competition, if it is not from one round to another, then it is from acompetition to another or from the first competition to the last one.

Through the results of the study, which showed the importance of the plyometric training method in maintaining the physical readiness during the competition stage for volleyball players, we recommend the coaches supervising volleyball players to adopt plyometric training, especially in the pre-competition stage, and follow at least a share of each mini-course of the competition stage. And also the use of the latest methods and techniques that have been developed from the plyometric training method.

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Correspondence:
Mokrani Djamel
Institute of Physical Education and Sports,
University of Mostaganem, Algeria
Email : djamel.mokrani@univ-mosta.dz