



## IMPROVEMENT OF POWER ABILITIES OF SKILLED FOOTBALL PLAYERS

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### Abstract

Skilled football players' competitive activities of recent years have been marked by significant changes associated with a growing number of one-on-one battles during the game and increasing requirements to the athletes' power abilities. Therefore, the power training improvement is an important factor of boosting the efficiency of playing activity of a modern player.

*The objective* – to characterize the peculiarities of improving the power abilities of skilled football players.

*Methods.* the analysis of scientific and methodological literature, the questionnaire and the methods of mathematical processing of the data obtained during the research.

*Results.* The analysis of the football players' activity during the game shows that a special speed-strength training has a significant importance for players. In order to get a clear idea of the football players' power training peculiarities, the muscles, the muscles groups and their stage of involvement in the athletes' specific competitive activity as well as the nature of modes of muscle contraction are analyzed. The ways and methods of skilled players' power training suggested by the specialists are considered. The description of the plyometric method as the most effective one for the players' power abilities development is given. A survey with a purpose of finding out the opinions of the football coaches who are practitioners about the importance of a power training and the application of means and methods aimed at players' power improvement is conducted.

*Conclusions.* The results of the survey demonstrate that most of the interviewed coaches put emphasis on the importance of players' power improvement, but the plyometric method is not widely used in their practical work.

**Key words:** football, power training, modes of muscle contraction, methods of power training.

### Introduction

Today football is one of the most popular and spectacular sports. In recent years, it has undergone significant changes associated with the growth of competition and the "price" of victory. Taking into account that in the largest international tournaments participate players who have high level of technical and tactical skills, the results of such games largely depend on physical capabilities of the athletes. The data presented in the literature show that the players of the leading world teams perform up to 700, and sometimes up to 1000 ball activities during high-level matches; with around 350 one-touch shots and about 150 two-touch or more shots. It is established that high-class players take part in 120-170 one-on-one battles, which include a tackling, an interception and a curl. In this case, the professional footballer

is in ball possession for only about 2 minutes on average during the game. In this regard, it is clear that the main activity of the player – an attempt to take possession of the ball and a game without a ball in the broader sense [2, 7, 12, 22].

The increase of one-on-one battles in the modern game influences the training process of athletes and in recent years has led to a clear tendency for greater involvement of skilled football players into power training. According to many authors, footballers need power training because it allows them to increase the efficiency of their gaming activities by the following effects: 1) speed, strength and power, that become an instrument for achieving the success in particular game situations of the match, develop; 2) the risk and seriousness of traumatizing and orthopedic injuries decrease; 3) the "sport longevity



of football players” – the duration of their sports career at the highest level prolongs; 4) as a result, an adequate increase in power abilities is one of the ways (additional chances) to become an outstanding player [1, 8, 11, 18, 21].

Thus, upgrading a power training is an important factor of improving the efficiency of players' gaming activities. At the same time, the progress in bettering the power qualities of skilled players has its own peculiarities, which are related to the specific character of players' physical activity during their competitive performance.

*The objective* – to characterize the peculiarities of improving the power abilities of skilled football players.

### Methods

Methods: the analysis of scientific and methodological literature, the questionnaire and the methods of mathematical processing of the data obtained during the research.

The conducted analysis of the scientific and methodological literature has allowed generalizing the existing data, approaches and ideas of various authors concerning the specifics and peculiar features of the power qualities' development of sportsmen who specialize in football. The survey has been carried out in order to identify the opinion of the practitioners about the factors of improving the capabilities of skilled players and to get broader insights on the topic of current work. 17 coaches who work with different Ukrainian football teams and have experience from 2 to 30 years have participated in the survey. Mathematical data processing has allowed obtaining the percentage of respondents' opinions.

### Results and discussion

Analyzing the data presented in the literature it is possible to establish that according to the opinions of many experts, the effectiveness of the competitive activities of the best football teams participating in the European and world championships, along with other aspects of preparedness and motor skills of players, largely depends on the level of players' special power training [3, 11, 17, 20]. In order to find out the opinions of practitioners about the importance and peculiarities of power training in the process of physical improving of footballers,

we conducted a questionnaire survey of coaches working with football teams from different cities of Ukraine. The analysis of the obtained results show that 64.7 % of the interviewed experts believe that power training helps to increase the speed of movements and to perform technical and tactical moves in the face-ups with the rival more effectively. Alongside with it, 52.9 % of the respondents believe that power training is able to reduce the risk and seriousness of orthopedic injuries, 29.4 % of the respondents are convinced that power training can prolong the sports career of footballers at the highest skill level. Despite this, some coaches have suggested that power training is not useful for footballers. Herewith, among its negative consequences they mention: 23.5 % of the respondents – a negative impact on the flexibility of athletes, 17.6 % – certain difficulties in movement, 17.6 % – a decrease in speed and 11.7 % – an increase of the possibility of injuries in the process of training. Commenting on the issue related to the focus area of power exercises, 64.7% of the coaches have said that the physical exertion should be equally distributed among all muscle groups, while the other 35.3% believe that the lower limbs training is especially important in the process of power training. Answering the question “What exercises do you use to develop the power of players?”, 52.9 % of coaches have reported that they use exercises with a medicine ball, 52.9 % – exercises on training equipment; 88.2 % use jumping exercises, 94.1 % use weight training, and 11.8 % are not in favor of any of the exercises mentioned in the questionnaire.

The theoretical analysis of the issue under study suggests that to the power manifestations of football players it is possible to include the following activities: 1) overcoming the gravity, the resistance of the weight of the athlete's body (high jumping, long jumping during the sliding tackle, kicking the ball out, side jumping for the goalkeepers, a jump-start with changing the direction while running, etc.); 2) overcoming the resistance, which is associated with the ball hitting and throwing in the ball; 3) overcoming the resistance during an opponent's power counteracting during the fight for the ball [13, 18, 19]. Herein, the analysis of the activity of football players in the game shows that most of the “crucial” game elements require a higher manifestation of the muscle power – the ability to demonstrate power



output in the shortest period of time – than the strength. In this regard, the “explosive” power and special speed-strength preparedness in general have special significance for footballers.

In normal conditions of a football player’s game, most often the object of force application is the weight of the football player’s body (various types of running acceleration, jumping, etc.). Therefore, one of the important elements of regulating the development of power is not only its specially aimed training, but also its regulation by the body of the athlete. It becomes especially evident in the manifestations of football jumping. For example, if during the preparatory period the footballer improves the jumping ability having a body weight of 1-4 kg more than his weight in the competitive period (during the season), then the decrease in the body mass to the usual (without a special intensification of the training of this type) leads to an increase in the maximum height of the jump by 5-10 %. According to researchers’ point of view, in recent years, the length of the body of footballers has been increasing much faster than their weight [6, 7, 14]. At the same time, the

power potential of players is falling behind the football demands. A few decades ago, the same situation was observed in professional basketball: basketball players were high (like today), but light and not very coordinated. Today, many of them are athletes with relief muscles, having weight of more than 100 kg and able to demonstrate the spectacular technique of game moves in the game [6, 18]. All this happened due to the fact that there were coaches who made the correct forecast of basketball development and increased the amount of power exercises dramatically. Today, this trend is observed in football [9, 15, 20]. To get a clear idea of the methods of power training of football players, it is necessary to analyze the groups of muscles, the degree of their involvement into the specific activity of the athletes, as well as the nature of their contraction modes [9, 10, 20]. The data presented in the literature show that the muscle contraction of football players is carried out in different modes: isometric; concentric; eccentric.

The analysis of the muscle groups and the degree of their involvement into the motor activity of football players is presented in Table 1.

Table 1

**The degree of the involvement of muscle groups in different contraction modes during football players’ competitive activities (by J. Bangsbo, 2006) [1]**

Muscle groups	Muscle contraction mode			
	Concentric		Isometric	Eccentric
	Low speed	High speed		
Leg muscles:				
Anterior	+++	+++	++	++
Posterior	+++	+++	++	+++
Extensors (quadriceps)	+++	+++	++	+++
Flexors	+++	+++	++	+++
Gluteal muscles	+++	+++	+++	+++
Upper body muscles				
Abdominal muscles:				
Lateral	++	++	+++	+
Anterior	++	++	+++	+
Deep	+++	++	+++	++
Back muscles				
Upper	+++	++	+++	+
Lower	+++	++	+++	+
Pectoral muscles	++	++	+	+
Shoulder muscles	++	++	+	+
Neck muscles	++	+	++	+
Muscles of the arm:				
Flexors (biceps)	++	+	++	+
Extensors	+	+	+	+

Notes: degree of involvement: +++ - high; ++ - average; + - low



The data presented in Table 1 provide information that allows differentiating the methods of developing the power of different muscle groups, depending on their contraction mode. Thus, it is obvious that the upper and lower back muscles, as well as the deep abdominal muscles, should be trained primarily by concentric low-speed contractions and in isometric mode, etc. However, relying on the data given in Table 1, it is necessary to take into account the need for individual adjustments that depend on the degree and nature of the development of power abilities of a player.

Over the years, power training was limited to the work with barbells and dumbbells, but recently there have been attempts to transform this type of work into movements that players perform on the playing field, indicating a need to combine the power with the speed of implementation of technical actions realized by players. As it is known, power exercises positively affect the speed only when the power is increased during performing the same movement, in which the highest speed rate is supposed to be shown [1, 5, 6]. Therefore, the improvement of power-speed abilities serves as a prototype for players' power training that practiced nowadays.

In the training of the speed-strength abilities of the players, the following exercises are considered to be effective: standing jumps (single, triple, five-step); running high and long jumps; a triple running jump; forward hops with weights (weight up to 10 kg); spring jumps on two legs with a barbell on the shoulders (the maximum weight of a barbell should not exceed 30% of the athlete's weight); jumps with kettlebell, standing on two benches, feet apart; leaps off the box of 40-100 cm high with following jump with one or two legs vertically up or forward; start (up to 10 m); rapid lifting of the weights by a thigh, standing on one leg; jumps with and without weights; sharp change in direction of a jerk; jerk jumps over an obstacle; jerks up (up to 10 m); pushes during running and jumps; listed above exercises with weights (up to 50% of maximal possibilities); kicks of the ball in full force; throwing-in the ball, throwing-in the medical balls; game, technical and tactical exercises with jumps, short jerks; depth jumps, depth jumps with jumping on a subject [4, 16].

One of the promising approaches to the improvement of speed-strength abilities of football

players, according to the ideas of the researchers, is the use of weights during the performance of special-training exercises. These weights can be used in the form of belts or vests, which weight amounts to 3-5% of the weight of a football player, that is around 3-4 kg. The researchers also claim that the weights of this mass do not violate the necessary interconnection in the work of specific muscles and muscle groups and allow the maintaining of specific structure of the motion [3, 4].

In experts' opinion, the most effective means and methods for the development and improvement of speed-strength qualities of football players are jumps and plyometric training [10, 17, 19]. The players' ability to jump is one of the most expressive manifestations and indicators of powerful characteristics of muscle groups activated in football, high-speed manifestations of strength. It has been established that the use of jumping training after a period of special power training with the weights allows converting the main absolute legs' power indices (and not only those of legs) into a specific power of a player in the best possible way. At the same time, the height of a jump is the most informative integral indicator of the effects of a special power training in terms of improving the power indices.

Plyometric method of training is based on the use of kinetic energy of a body (apparatus), kept at its drop down from a height, for stimulation of muscle contractions. Braking the drop down of the body at a relatively short path causes a sharp stretching of the muscles, stimulates the intensity of motor neurons central impulsation and creates in the muscles elastic stress potential. In the further transition from the plyometric to the miometric contractions, a faster and more efficient contraction is observed [18]. The use of the plyometric method in the training process of highly skilled players is very diverse, with most exercises connected with jumps of different types on one or two legs – vertical, horizontal and their combination. The side-to-side one- or two-leg jumps, as well as their interchange are widely used. In addition, it is possible to regulate the vertical component, introducing various obstacles, regulating the movement of hands to enhance the “explosive” nature of plyometric movements. Usually, 5 series of 10 repetitions with



an obstacle height varying from 15 cm to 90 cm are suggested.

To the typical vertical movements of plyometrics belong maximal one- or two-leg vertical jumps. D. MacDougall described this type of jump in a series of special works in the most detailed and clear way [13]. It is also recommended to use an upward jump tucked, being at the top point of a vertical jump (one leg or two legs). This activity is performed in series (from 1 to 5) with 5-10 repetitions in a series. Another exercise of this type is a vertical squat jump (the angle in the knee joint is about 90°) with maximum use of arm movements. There are other variants of the realization of this exercise, for example the performing of such a jump with one second pause (with the angle in the knee joint about 90°), the performing of dual jumps of this type or the performing of this very jump three times in a row. The number of repetitions is the same as in the previous version of the plyometric vertical movement.

The typical horizontal movements of the player's plyometrics are one- or two-leg standing long jumps. The widespread use of such exercises is determined by the increased ability of players to change the speed quickly and perform sprint acceleration making use of the "explosive" component along with running movements. The dual jumps or jumps performed three times in a row can be viewed as the varieties of the jumps mentioned above. Typically, this activity is performed in series (from 1 to 5) with 5 repetitions in a series.

Jumps over obstacles (low hurdles, cone marks, etc.) with horizontal straight-line movement are another option of horizontal plyometric exercises. In this case, a certain distance and the number of obstacles (repetitions) are established with the requirement to maintain the balance of the body, the straight motion and the rhythm of the jump movements. The complexity of the exercise is modified by the height of the obstacles that simulate game situations. Usually, this activity is performed in series (from 1 to 5) with 3-10 repetitions (obstacles). It is better to perform fewer repetitions, but stick to the maximum height or length of the jumps.

The indicated ways of the plyometric training usage in the preparation of football players

enable the achievement of the following results: 1) the speed of movements in sprints, multi jumps and in some other types of jumps becomes better because of the increasing speed-strength capabilities of the leg muscles. Special plyometric training with additional weights helps to perform exercises with greater force and in a shorter time; 2) the balance of the body improves, that results in a good dynamic equilibrium in overcoming obstacles, jumping and jumping over, as well as in the ability to change the direction of movement quickly during the game; 3) the explosiveness also progresses favourably.

At the same time, the main factors of the effectiveness of the plyometric training of football players are: the special targeting of the preliminary (parallel) power development (there is an evidence that the athletes should be able to raise up from the squat position with the weight which is 1.5-2.0 times bigger than their body weight before they can be involved in plyometric training); providing the conditions for minimizing the risk of injury in the process of training (special emphasis should be put on warming-up activities and the preparation of joints, muscles and tendons; it should include: thermal procedures, rubbing, etc.); the use of an adequate specificity of the football technique of exercises performing.

When it comes to the creating of training programs for the power development, it is important to consider the most general conceptual approaches: firstly, it is necessary to analyze the nature of the requirements for players taking into account their game positions, individual initial conditions and abilities, as well as the overall strategy of the team; secondly, it is required to organize a training process of power orientation (selection of equipment, combination of means) and determine its place in the overall system of training; thirdly, it is crucial to determine whether the coach has sufficient experience and qualification (competence) of for all the stages of power training.

## Conclusions

1) the development and the improvement of power abilities are positively reflected in the manifestation of other motor abilities and the



effectiveness of competitive activities of football players in general;

2) improving the power abilities of football players one should take into account the contraction mode and the degree of specific muscle groups involvement into specific game activities;

3) competitive activities of football players mostly require high level of power output demonstration in the shortest time, indicating the need to combine strength with the speed of technical actions performed by players;

4) the jumps and plyometric training are the most effective means and methods of football players' speed-strength qualities improving.

Further research suggests the elaboration of programs for improving the abilities of skilled players and their implementation into the athletes' training process at different stages of preparation.

### Conflict of interest

The author does not have any conflict of interest to announce.

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