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Effect of functional exercises on the explosive ability and accuracy of shooting from outside the three-point line in advanced basketball players

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ABSTRACT

The field of sports training has been modified in recent years by the revolution of science and the selection of the best and most modern methods that suit the specialized activity. The present study was based on utilizing the modern training methods in the form of functional exercises in the training schedule of the players and to see its impact on the explosive ability and accuracy of shooting from outside the three-point line in advanced basketball players. The present study was conducted on basketball players at Al-Tadamun Sports Club in Najaf Governorate in the sports season 2020-2021 within the time frame of June 2021 to August 2021. A total of 14 students were present in the research community. Participants were randomly allocated into two groups (experimental group and control group). The participants of the experimental group received training using functional exercises, whereas participants of the control group received regular training by the method used by their coach. Based on the findings of the present study, it was concluded that the training of participants of the experimental group with functional exercises contributed to the development of the accuracy of the shooting skill from outside the three-point arc of basketball.

KEYWORDS

Functional exercises; three-point line; basketball players.

1. INTRODUCTION

There is no doubt that scientific research has become one of the necessities in our modern society in reaching the highest levels for all aspects of life by identifying what god has endowed man with different abilities and energies. Various researchers keep on conducting researches using modern scientific methods with the aim to achieve the most considerable possible amount of benefit

from scientific theories and their application to serve and develop society, including the sports field. Many sports events may require a significant amount of time in order to reach the highest level of capabilities (Jastrzębska et al, 2022; López et al, 2019, 2022).

The training process has taken a form, building and group reliable with the state of the new evolution of the methods, and means used in the training process. The field of sports training has been modified in recent years by the revolution of science and the selection of the best and most modern methods that suit the specialized activity (Monadi et al, 2022; Sánchez et al, 2019).

In the past decade, many sports events and games have attained attention. Out of pool of games, basketball stands one of the most popular games. Basketball game requires the great muscular ability to perform its skills, which require high intensity performance requiring high level of strength, speed and endurance as key bio-kinetic abilities in the players (Hashem et al, 2022; Monadi et al, 2022). The skill of shooting from outside the three-point arc requires an excellent level of physical and skill performance in a consistent manner. Hence, the physical ability and motor performance must serve each other to achieve the goal, which can determine the player's ability.

Because of the multiplicity and diversity of training curricula used by coaches at the level of clubs and teams and the overlap of these curricula, specific requirements of the players relevant to the game gets neglected. Hence, the present study was based on utilizing the modern training methods in the form of functional exercises in the training schedule of the players and to see its impact on the explosive ability and the splash of shooting skill from outside the three-point arc of basketball for advanced players,

Researchers observed that there was heavy reliance of trainers on using old training methods for basketball players neglecting the, physical and functional abilities of the players. Hence the researcher identified the need and formulated functional exercise protocol for training sessions of players. This functional training method is one of the modern training methods in which high-intensity training is used in a short time, and this is commensurate with the nature and characteristics of the game. Thus, improving the explosive ability, which is revealed in the level of performance under the conditions of extreme work, and raising the level of physical and skill, and through the previous, can review the research problem in the following question:

Do the functional exercises have a beneficial effect on the explosive ability and shooting skills from outside the three-point arc of basketball for advanced players?

The aim of the present study was to identify the effect of functional exercises on the explosive ability and accuracy of shooting from outside the three-point basketball line for advanced players. The research hypothesis was that there would be a significant effect of functional exercises on the

explosive ability and accuracy of shooting from outside the three-point line of basketball for advanced players.

2. METHODS

2.1. Design and participants

The present study was conducted on advanced basketball players at Al-Tadamun Sports Club in Najaf Governorate for the sports season 2020-2021 within the time frame of June 2021 to August 2021. A total of 14 students were present in the research community. The design was experimental, with participants randomly allocated into two groups, i.e. experimental group and control group. The participants of the experimental group received training using functional exercises, whereas participants of control group received regular training by the method used by their coach.

2.2. Devices, equipment and means used in the research

In the present study, many tools, devices, and aids were used for the purpose of data collection with the aim to achieve the objectives of the research. The various tools used in the present study included 8 basket balls of the type Molten, 4 colored adhesive tapes, 1 measuring tape of 40 meters, a blackboard, a chair, 12 medicinal balls of different weights (1, 2, 3, 4, 5 kg), 10 barriers of different heights (70, 60, 50, 40, 30) cm, dumbbells of different weights (4, 5, 6 kg), bell balls of different weights (2, 4, 6 kg), TRX training tapes, sports stopwatch type (Casio), whistle type FOX, stationery (papers and pens), and Lenovo laptop calculator.

2.3. Field research procedures

2.3.1. Babylon test to measure the explosive ability (power) of the muscles of the legs (vertical jump test) (Mardan, 2001)

This test was intended to measure the explosive power of the muscles of the legs. Various tools required for the measurement of this test included medical scale, tape measure, a wall on which a tape measure was attaché and a piece of chalk. The test measurement was started by measuring the weight of participants. They were directed to raise the marked arm over their entire length to make a mark with the fingers on the wall or the blackboard, without losing the contact of heel from the ground. Once the participant was ready, he was asked to immediately make a double vertical jump to the highest possible height to mark the access point utilizing fingers dipped in chalk powder. Each

participant was given two attempts. The weight and jump height data for each participant was recorded and processed using the following equation, bearing in mind that the weight is in newton and can use the player's mass in kilograms, provided that the numerator of the equation is multiplied by 9.8.

$$\text{power (watt)} = \frac{\text{jump height} \times \text{mass} \times 9.8}{\sqrt{\frac{2 \times \text{Jump height}}{9.8}}}$$

2.3.2. The explosive ability (power) of the arms: a test of throwing a medical ball of 800 g from sitting on a chair for the maximum possible distance (Al-Fadhli, 2010)

This test was intended to measure the explosive power of the initial-deferred arm. Various tools required for the measurement of this test included a chair, two medical balls weighing 800 grams, a measuring tape, and two cameras. The participant was made to sit on a chair. Participant was fixed with a rope from the back side. Followed by which they were asked to pull the arm back to the farthest extent provided that the other arm is not used by throwing and then he was asked to throws the ball with one hand. Each participant was given two attempts. The farthest distance was measured and documented. The explosive power is calculated using the following equation: The explosive power of the arms = Mass of the shooting arm + mass of the ball x distance of the ball / time of flight.

2.3.3. Shooting test for a distance of 6.75 meters (Ayoub et al., 2014)

This test was intended to measure the initial decision of long-range shooting in basketball. Various tools required for the measurement of this test included basketball, basketball board, masking tape. The player was directed to shoot the ball towards the basket from five points identified by a mark drawn on the ground for a distance of 6.75 m. The basketball was without the ball touching the board, and each player performed 10 consecutive throws from the mentioned distance and with two throws from each mark, a back and forth throw. Three points are awarded for each successful throw in which the ball enters the basket without touching the ring when it was thrown. Two points were awarded for each throw in which the ball touches the ring and enters the basket when it is thrown. One point was given for each throw that touches the ring and is not entered when it is thrown. The total score was taken as sum of points obtained for the total of 10 throwing attempts.

2.3.4. Exploratory experience

Researcher conducted an exploratory experiment on a sample selected from the original research community, outside the research sample. A total of four participants were selected as sample for the exploratory experiment. The exploratory experiment was conducted in the month of august 2021. The exploratory experiment was conducted with the aim to verify the validity of the tools used in terms of positive assistance, and the availability of safety to work on knowing the appropriateness of the exercises, knowing the difficulties that the researcher may encounter during the course of the study and providing appropriate solutions to them, Knowing the time taken to perform the tests, knowing the readiness of research sample to perform the skill tests.

2.3.5. Main Experiment

- Initial-tests:

Initial tests were conducted in the month of June 2021 after successful completion of exploratory experiment.

- Initial-test preparation and implementation of functional exercises:

Initial preparations and prerequisite arrangements were done by formulating the protocol of functional exercises, to be implemented on the participants of the experimental group, taking into account (density, recurrences, and appropriate rest periods). The primary data collection was done from the month of June 2021 to August 2021. The functional exercises were formulated based on scientific foundations along with the physical and functional abilities of the participants so that these exercises can develop the explosive ability and accuracy of skills of shoot outside the three-point arc of the basketball and to achieve the aims and objectives of the training method.

- The particulars of the functional exercises are as follows:

In the present study, the participants of experimental group received training with functional exercises protocol, formulated by the researcher with the aim to develop explosive ability among basketball players and to improve the precision of the skill of shooting from outside the three-point arc of basketball, Taking into account the exchange of work amongst muscle groups.A total of 24 training sessions were given i.e. three sessions per week for total of eight weeks. Each training

session was completed in 20-25 minutes. The training was given on alternate days i.e. on Saturday, Monday and Wednesday.

- Final-Tests:

Post training sessions of Functional exercises to the participants of experimental group, final tests were accomplished by the researcher and his fellow teammates in the month of august 2021.

2.4. Statistical methods

In the present study, statistical analysis was carried out with the Statistical Package for the Social Sciences (SPSS) by computing arithmetic mean, standard deviation and t test.

3. RESULTS AND DISCUSSION

The results shown in Tables 1 and 2 for the tests of the study variables presented that there were significant variations between the initial-test and final-tests and in favor of the final-tests for both the groups. The researcher attributed the significant findings to the use of functional exercises in the training schedule of participants. Functional exercises are the exercises in which, movements occur within three directions and planes i.e. lateral or sagittal, frontal, transverse plane. Generally, any sports activity involves collective effort of muscles in order to perform any particular skill relevant to the game. Similarly, in Basketball game muscles work collectively in all the planes to achieve the best outcome for any specific skill. These collective action of muscles cause development of muscular strength as a basis for bio-kinetic capabilities. The training of players based on functional exercises also worked on the same principle and thereby caused increase in muscle strength of the players. The functional exercises are the ones that “coordinate the work of the muscles together to produce the optimal energy for motor work, strength and protect joints from injury (Carlos, 2016). The functional exercises focused on increasing the neuromuscular compatibility through the work of the muscles together during the motor performance, which contributed to increasing the explosive power.

The findings of the present study were in accordance to a study conducted by Carlos, 2016. Authors in the study stated that there is strong need to use functional exercises in training curricula "because it achieves an increase in strength without gaining weight. One of the most important characteristics of neuromuscular adaptation is that one can become strong without gaining increase in size. Simply by coordinating the work of the muscles and muscular systems by distributing the load

(heavy) on the different muscles of the body. Functional exercises involve group action of the muscles which is the essence of increasing strength through neuromuscular coordination (Dixon, 2011). In a study conducted by Dixon in 2011, the author stated that "the training that includes all the primary and secondary muscles that contribute to the implementation of motor performance and creates the so-called skill stability during performance, is the balancing force of continuous neuromuscular work with the recruitment of motor units within the muscle".

As shown in the results of the current study, the explosive ability tests, the research sample for this group has developed, and this confirms the correlation between that ability, which led to the development of shooting from the three-point arc output. Miteb (2003) also worked in the direction of physical abilities and its correlation with the skilled performance of the players. The physical factor must include strength and speed. This helped the players to jump and move in all directions quickly. Hence, the researchers were keen to achieve the better outcomes in all the training units of the experimental research group. Based on the foregoing, the functional exercises were prepared and carefully executed, taking into account the physical and biomechanical capabilities of the individuals. Miteb (2003) in a study stated that, "The rationing of the intensity, size and intensity of training loads in special training units to develop performance endurance is to shed an effective training burden on the muscles and vital devices and to ensure the players' performance under the influence of an appropriate level of fatigue, which is necessary to develop special endurance" (Carlos, 2016).

Table 1. The result for the initial and final tests of the control group for the studied variables.

Variables	**Unit**	**Initial**		**Final**		**T value**	**P value**	**Type Sig**
		Mean	**Std. deviation**	**Mean**	**Std. deviation**			
The explosive ability of the legs	Watt	1308.031	37.804	1379.608	33.684	3.752	0.013	sig
The explosive ability of the arms	Watt	1012.145	22.14	1043.421	18.364	4.214	0.001	sig
Accuracy of shooting skill from outside the three-point arc	Degree	13.6	1.67	17.4	0.55	5.17	0.007	sig

Table 2. The result for the initial-test and final-tests of the experimental group for the studied variables.

Variables	Unit	Initial		Final		T value	P value	Type Sig
		Mean	Standard deviation	Mean	Standard deviation			
The explosive ability of the legs	Watt	1311.511	30.735	1472.207	21.904	8.137	0.000	sig
The explosive ability of the arms	Watt	102.214	24.514	105.894	7.325	6.254	0.000	sig
Accuracy of shooting skill from outside the three-point arc	Degree	13	1.22	22.4	1.14	9.59	0.001	sig

Table 3. The differences between the test results (final-test) for the experimental and control groups for the studied variables**.**

Variables	Unit	Control		Experimental		T value	P value	Type Sig
		Mean	Std. deviation	Mean	Std. deviation			
Maximum oxygen consumption	ml/kg/min	45.6	20.63	47.6	0.84	2.28	0.034	sig
Rolling	Sec	28.60	1.07	25.50	0.84	7.15	0.000	sig
Scoring	Degree	16.30	0.94	19.10	0.73	7.36	0.000	sig

Table 3 describes the significant difference between the explosive abilities of arms and legs between experimental group and control group. The results indicated that Functional exercises based training of participants of experimental group helped in developing the explosive ability in the arms and legs along with the accuracy of shooting from outside the arc. Hence the association of strength and speed had a practical impact on players' motor performance. The researcher provided training to the participants using functional exercises like chest exercises, stabilization exercises with partridge exercises at an appropriate height and distances to serve the development of the explosive ability of the two legs. The researchers provided training with functional exercises using various tools like medical balls, floor stairs, deep jumping, the use of obstacles. The (TRX) has had an impact on

developing this ability. The findings of the study are in accordance to the study conducted by Qassem Hassan, Mansour Jamil. They stated that the exercises in which resistance is used are one of the appropriate means to improve explosive ability. Al-Abnaki (1988) confirmed that TRX training is one of the forms of functional resistance training that aims to direct the resulting force in the direction of performance and lead in multi-level and integrated movements. Thus the use of modern training methods and tools played an important role by contributing to increasing motivation and improving bio-kinetic capabilities that gain the player muscle strength, which in turn leads to reaching the optimal motor path in the implementation of duties during play.

4. CONCLUSION AND RECOMMENDATIONS

Based on the findings of the present study, the researchers concluded that the training of participants of the experimental group with functional exercises contributed to the development of the accuracy of the shooting skill from outside the three-point arc of basketball. Positive development of the explosive ability in shooting from outside the three-point arc of basketball for advanced players was seen among players of the experimental group.

According to the set of conclusions adopted and formulated by the researcher from the results obtained in this experiment, some recommendations were made by the authors. The training schedule of basketball players should be based on scientific foundations. This study also emphasized the necessity of legalizing the training load for functional exercises to suit the type of practitioners in terms of gender, biological and training age, because they have a high impact on the body during performance.

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All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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