Scholar's Digest- Journal of Multidisciplinary Studies
Volume 4, Issue 4, April 2025
ISSN (E): 2949-8856
Scholarsdigest.org

THE EFFECT OF RANDOMIZED, VARIABLE-INTENSITY EXERCISES ON SOME PHYSIOLOGICAL VARIABLES OF ADVANCED BASKETBALL PLAYERS

Waleed Kamil Rashoody
Ministry of Education / General Directorate of Education, Qadisiyah
Waleedalkhaldi841@gmail.com

Abstract
The researcher aimed to use randomized, irregular-intensity exercises and identify their physiological effects on advanced basketball players. He aimed to randomize the various exercises to measure the direct impact of these exercises on the players. The researcher intentionally selected the research sample, which consisted of 12 advanced basketball players in the Diwaniyah Governorate. The researcher then tested the homogeneity of these players. The researcher used the experimental method using a single-group approach to suit the research project. The researcher conducted and implemented the research items on the target sample, including variables such as heart rate, maximum oxygen consumption, oxygen debt, and oxygen deficit. The physical exercises took place over a period of four weeks, with four training sessions per week. The duration of the training session ranged approximately 60 minutes, during which the research exercises targeted by the researcher were implemented. The aim was to determine the clear impact of these exercises on the studied variables, and to determine whether the random exercises had a significant impact. These variables were examined in order to accurately design training programs in light of the results obtained in this study. The researcher then drew his most important conclusions and recommendations based on the results obtained in this study, which demonstrated that exercises, even if random and varying in intensity, have a clear impact on the body's systems and physiological variables.
In light of the results obtained, the researcher concluded that random physical exercises have an impact on the body's physiological variables, even if they are random and unregulated

Keywords: Random exercises: These are exercises that vary in intensity and impact the players, such that the training intensity increases at times and decreases at other times.

Introduction

Modern sports training is now looking for the most effective exercises and training programs that achieve the desired results in the shortest time and at the lowest cost. This is done in order to achieve the desired results in the shortest and least expensive ways, avoiding traditional and routine training programs as much as possible. Here, the researcher sought to use physical exercises with a random, varying physiological effect, not subject to specific intensities. This would sometimes increase significantly and at other times decrease, with the goal of determining which has the greatest impact and effectiveness on the research variables under study. From here, the researcher's vision crystallized in this study, and he

used the most basic physiological variables, namely heart rate, maximum oxygen consumption, oxygen debt, and oxygen deficit. In this study, the researcher sought to prove, through his prior hypotheses, that random, varying training intensities have an impact on the body's physiological variables. Although exercises are not subject to regulation, they have a clear impact on the body's physiological variables. From this concept, the importance of the research in guiding the work becomes clear, and whether random exercises have an impact on the body's physiological variables or not, in light of the achieved results.

1-2 Research Problem:

Through the researcher's observation of the physical exercises of many players and his personal observation of exercises using training programs of varying intensity, we observed that intensity sometimes increased and other times decreased, without knowing which was better or more effective in achieving results. The researcher's vision was to conduct a realistic study of these exercises and programs on players, arrive at realistic results, and disseminate the results to benefit players, coaches, and those interested in this segment, making the most of their time and effort and achieving results with the least possible time and effort.

1-3 Research Objectives

1. To prepare random physical exercises of varying intensity and determine their effect on some physiological variables for advanced basketball players.
2. To identify the effect of physical exercises of varying intensity on some physiological variables for advanced basketball players.

1-4 Research Hypotheses:

There is a statistically significant effect of physical exercises with varying and different training intensities on some physiological variables for advanced basketball players.

1-5 Research Areas

1- Spatial Area: The hall of the National Center for Talented Sports in Diwaniyah.
2- Temporal Area: From January 3, 2024 to February 12, 2024.
3- Human Area: Basketball players at the National Center for Talented Sports in Diwaniyah.

2-1 Research Methodology:

The researcher used the experimental method using the single-group approach due to its suitability to the nature of the problem.

2-2 Research Sample:

The researcher selected the sample intentionally, comprising 12 basketball players at the National Center for Talented Sports in Diwaniyah..
The homogeneity of the players was performed as shown in the table below.

Table (1) shows the homogeneity of the research sample members:

No.	Statistics	Experimental Group	Coefficient of Variation	Skewness	Significance
	Variable	Mean (M)	Std. Deviation (SD)	Skewness	Homogeneity
1	Height	173.54	2.293	0.247	Homogeneous
2	Weight	79.26	3.115	0.342	Homogeneous
3	Age	39.76	3.575	0.281	Homogeneous

2-3 Research variables studied:
(Heart rate, maximum oxygen consumption, oxygen debt, oxygen deficit)

2-4 Methods, devices, and tools used in the research:
The researcher used a number of devices and tools to obtain the required data, as follows:
1- Whistle
2- Stopwatch
3- Scale to measure height
4- Treadmill
5- Computer
6- Scale to measure players' weights
7- Exercise bike
8- Basketballs
9- Training indicators

2-5 Field research procedures:
2-5-1 Pre-measurements (before implementing the training program):
The researcher conducted pre-measurements of the research variables on Thursday, January 5, 2024, in the main laboratory hall of the College of Physical Education and Sports Sciences. The researcher provided some instructions on how to perform the required exercises for the players, how to handle the equipment used, and the need to exert effort to achieve the desired results. Actual Results of the Work

2-5-2 Implementation of the Training Program Prepared by the Researcher:
The researcher implemented physical exercises on the research sample for one month, at a rate of four training units per week, starting from January 8, 2024, until February 9, 2024. The duration of each training unit ranged from 50 to 60 minutes. During this period, the researcher applied his research components and randomized high- and low-intensity exercises to the players. The researcher used randomized high-intensity exercises with a group of 12 players, and randomized low-intensity exercises with the same group of players. The researcher examined the effect of these exercises on the research variables under study.

2-5-3 Post-Measurements:
After the researcher completed implementing his training program on the research sample, the researcher implemented the same procedures he used for the post-measurements under the same conditions and circumstances as previously described.

2-6 Statistical Methods:
The researcher used SPSS to extract statistical data.

3-1 Presentation, Analysis, and Discussion of Results:
At the end of the research, the researcher placed the results he was able to obtain in special tables. This facilitated the reading process and determined the preference of the results for each group. This also clarified the researcher's ability to apply his hypotheses and achieve the objectives he set before implementing his physical exercises, as well as the contribution these objectives and hypotheses made to solving the research problem.

Table No. (2) shows the arithmetic means, standard deviations, calculated t-value, and the significance of the differences in the variables studied for the high-intensity exercise group.

No.	Variables	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	t-value	Sig. Level	Statistical Significance
1	HR	184	3.32	177	3.00	14.241	0.002	Significant
2	VO2max	38.54	1.52	42.11	1.25	14.516	0.000	Significant
3	Oxygen Debt	33.00	1.48	39.46	1.24	20.245	0.000	Significant
4	Oxygen Deficit	546.72	88.23	198.03	78.05	4.634	0.043	Significant

3-2 Discussion of the results:
From what was presented in Table 2, the researcher concluded:
1- Heart rate:
From Table No. (2), it is clear that there are statistically significant differences between the pre- and post-tests, in favor of the post-test regarding the heart rate variable. The researcher believes that this change in heart rate is due to the use of exercises, and that although the exercises are random, the physiological effect is present and clear on the body's various systems, most notably the heart rate. Heart rate refers to the number of times the heart contracts per minute. In a normal person who does not suffer from certain diseases, it ranges between 60-80 beats per minute (Abu Al-Ala Abdel Fattah: 1997, p. 63). It differs in women and children. Heart rate is one of the most important factors in regulating cardiac output, whether during low- or high-intensity physical activity. Heart rate is determined by stimulation in the atrial nodes. Heart rate is calculated using the arterial pulse rate or by the number of heartbeats on the rib cage via auditory stimuli (Muhammad Hassan Alawi: 1997, p. 226).

2- Maximum Oxygen Consumption:
From Table (2), it is clear that there are statistically significant differences between the pre- and post-tests, in favor of the post-test, regarding the VO2max variable. The researcher believes that this change in maximum oxygen consumption is due to the use of random,

varied, and varying intensity exercises. Although these exercises are random, they have a physiological effect on the respiratory systems. The body's various variables, including maximum oxygen consumption.

VO2max refers to the body's maximum capacity to consume oxygen, or the peak of the body's ability to transport and utilize oxygen. It is also the maximum total volume that can be consumed per minute during training. It is considered a promising measure of the functional capacity of the oxygen-generating system.

(Talha Hussam Al-Din, 1997, pp. 64-65)

3- Oxygen Debt

From Table (2), we can see that there are statistically significant differences between the pre- and post-tests, in favor of the post-test regarding the oxygen debt variable. The researcher believes that this change in oxygen debt is due to the use of random exercises of varying intensity, as these exercises led to physiological changes in the athlete's body, even if they were unintended. One of these variables directly affected by the exercises is oxygen debt. The researcher believes that oxygen debt is the amount the body needs during physical exertion, especially intense physical exertion, and that the body cannot provide, which forces the body to borrow this amount from other body systems, leading to the emergence of what is known as oxygen debt.

Oxygen debt is the amount the respiratory system can provide during physical exertion. It can then be calculated after physical exertion by dividing the amount of oxygen consumed after exertion and reaching normal consumption during rest (Ammar Jassim: 2010, p. 78).

4- Oxygen Deficit

From Table (2), it is clear that there are statistically significant differences between the pre- and post-tests, in favor of the post-test regarding the oxygen deficit variable. The researcher believes that this difference between the pre- and post-tests is due to the use of random exercises of varying intensities, which directly affected the various body systems, most importantly the respiratory system, through the phenomenon of oxygen deficit.

The researcher believes that the phenomenon of oxygen deficit is the amount of oxygen the body needs or requires during physical exertion that the body is unable to provide. As a result of this disparity, the phenomenon of oxygen deficit arises. Oxygen deficit represents the difference between the oxygen the body requires and the oxygen the body is able to provide (Hazza bin Muhammad Al-Hazza: 2005, p. 2). Oxygen deficit refers to the oxygen the body and muscles need that is not available during the first minutes of physical exertion. The athlete can compensate for this deficiency during the remainder of the exercise, especially if the intensity of the exercise is low.

4-1 Conclusions

Random, variable-intensity exercise has a clear impact on some of the physiological variables studied by the researcher. These include:

1. There is a clear change and effect on heart rate as a result of the exercises used. As a result of these exercises, we observe a clear decrease in these heart rates during physical activity.
2. Random, variable-intensity exercise has a significant impact on maximum oxygen consumption.
3. There is a clear effect of these exercises on oxygen debt.
4. As a result of the random exercises used, we observe a clear change and decrease in the percentage of oxygen deficit during physical activity.

5-1 Recommendations

The researcher recommends:
1. Using exercise, even if it is random.
2. Using sports training, whether standardized and organized or unorganized, has numerous physiological repercussions on the athlete's body.
3- Regulating training processes has positive repercussions that can be calculated and studied, but random exercises have physiological repercussions that may not be studied and calculated.
4- The use of random exercises of varying intensity must be appropriate for the age group targeted in the research to achieve somewhat realistic results.
5- It is necessary to conduct other similar studies on other age groups to determine the effect of these exercises on these age groups, as well as to obtain more details and more information about random training and its physiological repercussions on the body.

Appendices

Appendix No. (1) Contents of random units of varying intensity. In these exercises, the intensity was determined by pulse.

Weeks	Unit Sequence	Exercises	Intensity	Volume	Rest Between Reps	Rest Between Sets
Week 1	First	Exercise 1	90%	3x4 sets	120 s/min	120 s/min
		Exercise 3		2x3 sets	120 s/min	120 s/min
		Exercise 6		2x4 sets	120 s/min	120 s/min
		Exercise 5		4x4 sets	120 s/min	120 s/min
	Second	Exercise 3	60%	4x4 sets	120 s/min	120 s/min
		Exercise 4		4x4 sets	120 s/min	120 s/min
		Exercise 1		5x3 sets	120 s/min	120 s/min
		Exercise 6		4x4 sets	120 s/min	120 s/min
	Third	Exercise 6	95%	2x4 sets	120 s/min	120 s/min
		Exercise 4		3x3 sets	120 s/min	120 s/min
		Exercise 4		2x4 sets	120 s/min	120 s/min
		Exercise 3		3x3 sets	120 s/min	120 s/min
	Fourth	Exercise 4	50%	4x4 sets	120 s/min	120 s/min
		Exercise 1		5x4 sets	120 s/min	120 s/min
		Exercise 5		4x3 sets	120 s/min	120 s/min
		Exercise 2		5x5 sets	120 s/min	120 s/min
Week 2	First	Exercise 4	90%	4x3 sets	120 s/min	120 s/min
		Exercise 6		3x3 sets	120 s/min	120 s/min
		Exercise 5		4x4 sets	120 s/min	120 s/min
		Exercise 1		3x3 sets	120 s/min	120 s/min
	Second	Exercise 6	75%	4x3 sets	120 s/min	120 s/min

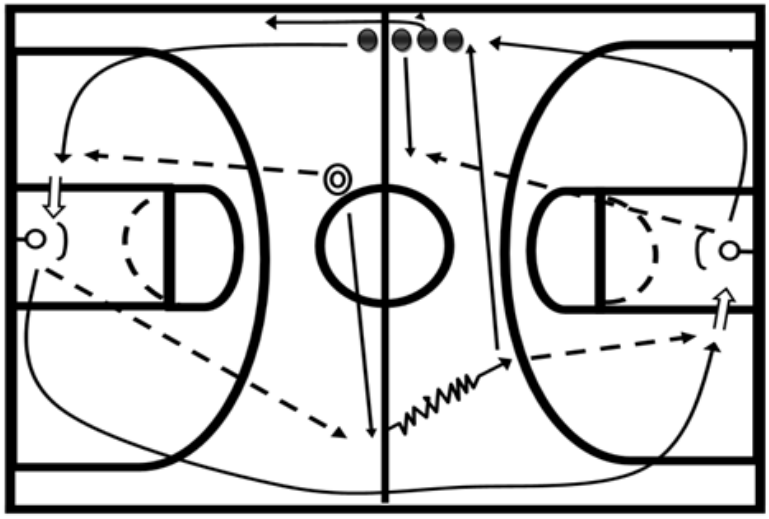
		Exercise 4		3x3 sets	120 s/min	120 s/min
		Exercise 3		4x5 sets	120 s/min	120 s/min
		Exercise 2		3x4 sets	120 s/min	120 s/min
	Third	Exercise 6	40%	4x5 sets	120 s/min	120 s/min
		Exercise 4		5x5 sets	120 s/min	120 s/min
		Exercise 5		4x4 sets	120 s/min	120 s/min
		Exercise 3		4x4 sets	120 s/min	120 s/min
	Fourth	Exercise 6	88%	4x4 sets	120 s/min	120 s/min
		Exercise 4		3x3 sets	120 s/min	120 s/min
		Exercise 3		3x4 sets	120 s/min	120 s/min
		Exercise 2		4x3 sets	120 s/min	120 s/min
Week 3	First	Exercise 5	70%	4x2 sets	120 s/min	120 s/min
		Exercise 4		4x3 sets	120 s/min	120 s/min
		Exercise 3		3x4 sets	120 s/min	120 s/min
		Exercise 1		3x5 sets	120 s/min	120 s/min
	Second	Exercise 1	65%	4x2 sets	120 s/min	120 s/min
		Exercise 6		3x3 sets	120 s/min	120 s/min
		Exercise 4		4x3 sets	120 s/min	120 s/min
		Exercise 2		3x3 sets	120 s/min	120 s/min
	Third	Exercise 1	85%	4x4 sets	120 s/min	120 s/min
		Exercise 3		4x4 sets	120 s/min	120 s/min
		Exercise 5		3x2 sets	120 s/min	120 s/min
		Exercise 2		3x4 sets	120 s/min	120 s/min
	Fourth	Exercise 4	90%	3x3 sets	120 s/min	120 s/min
		Exercise 6		3x4 sets	120 s/min	120 s/min
		Exercise 2		4x3 sets	120 s/min	120 s/min
		Exercise 1		4x4 sets	120 s/min	120 s/min
Week 4	First	Exercise 4	70%	5x3 sets	120 s/min	120 s/min
		Exercise 6		4x4 sets	120 s/min	120 s/min
		Exercise 5		3x4 sets	120 s/min	120 s/min
		Exercise 1		3x2 sets	120 s/min	120 s/min
	Second	Exercise 3	95%	3x3 sets	120 s/min	120 s/min
		Exercise 1		3x4 sets	120 s/min	120 s/min
		Exercise 2		3x4 sets	120 s/min	120 s/min
		Exercise 5		3x3 sets	120 s/min	120 s/min
	Third	Exercise 4	60%	4x3 sets	120 s/min	120 s/min
		Exercise 5		5x4 sets	120 s/min	120 s/min
		Exercise 3		4x4 sets	120 s/min	120 s/min
		Exercise 1		4x4 sets	120 s/min	120 s/min
	Fourth	Exercise 5	85%	3x3 sets	120 s/min	120 s/min
		Exercise 6		3x4 sets	120 s/min	120 s/min
		Exercise 3		3x4 sets	120 s/min	120 s/min
		Exercise 4		2x4 sets	120 s/min	120 s/min

Appendix No. (2) illustrates the exercises used in this research.

Exercise (1):

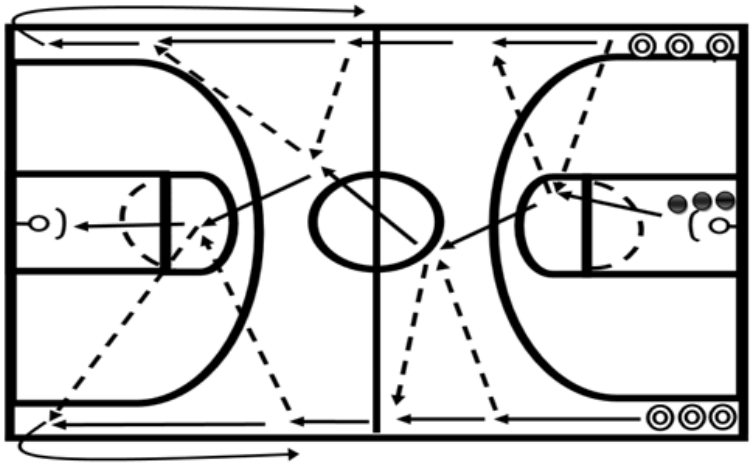
A group of 4-5 players stands next to the sideline at the center of the court. One player stands next to the center circle holding the ball. The player in possession of the ball passes it to the first player from the group next to the endline, who takes an offensive course next to the sideline. He shoots and takes possession of the ball after shooting. The player in possession passes the ball to the same player to whom he passed the ball. He moves across the middle of the court and takes an offensive course next to the sideline. The player receiving the ball

dribbles toward the free-throw area, then passes the ball to the interceptor, who shoots at the basket. The interceptor takes possession of the ball and passes it to the first player from the group, who moves to receive the ball next to the center circle. The next player to receive the pass takes the offensive course.



Exercise (2)

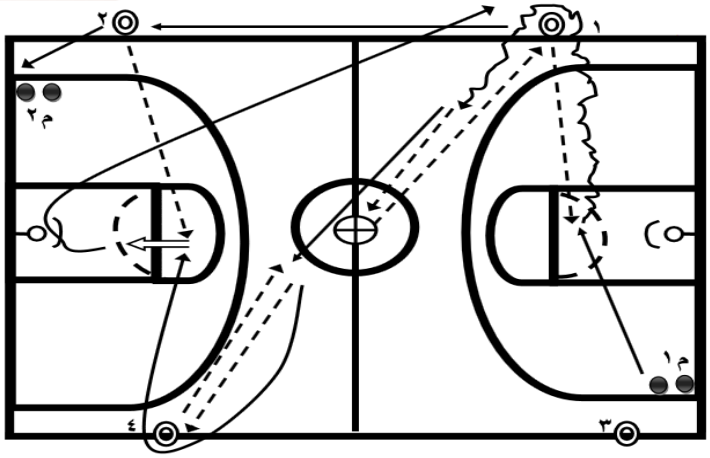
Three players stand at the end of the field behind the end line. One player stands in the middle, one on the right side, and one on the left side. The balls are held by the players on the right and left sides. The three players start off at the same time. The player on the right side passes the ball to the midfielder, who returns it to him. The player receives a pass from the player on the left side and returns it to him. The exercise continues until the end of the field. The players return to their starting point in the same exercise, emphasizing speed during the performance.



Exercise (3)

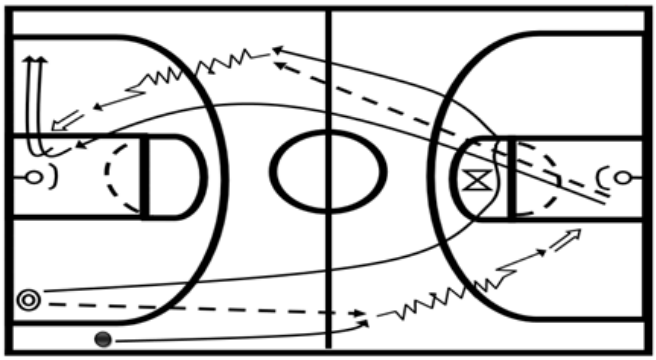
The team is divided into two groups: Group (1) is at the right end of the field, and Group (2) is at the opposite end of the field, on the left, diagonally. The remaining players (2, 1, 3, 4) stand on the side borders of the field, facing each other. Each player has a ball. The first player from Group (1) starts and receives a pass from the player to his right, i.e., he

receives a pass from Player (1) to his right, who is standing at the side borders of the field. The reception is halfway between the players. The receiving player dribbles the ball, circles around the player who passed him the ball, and then passes it to the coach, who is standing in the middle of the field. The coach, who in turn returns it to Player (1), then runs towards Player (4) to receive a pass from him and returns it to him. He runs behind him, turning towards Player (2) to receive a pass at the free-throw area, to shoot, follow the ball, and pull it back. He then moves to take Player (1's) place. Player (1) takes the place of Player (2), who heads behind Group (2). The first player from group (2) performs the same method of performance and according to his position in the method of player substitution.



Exercise (4):

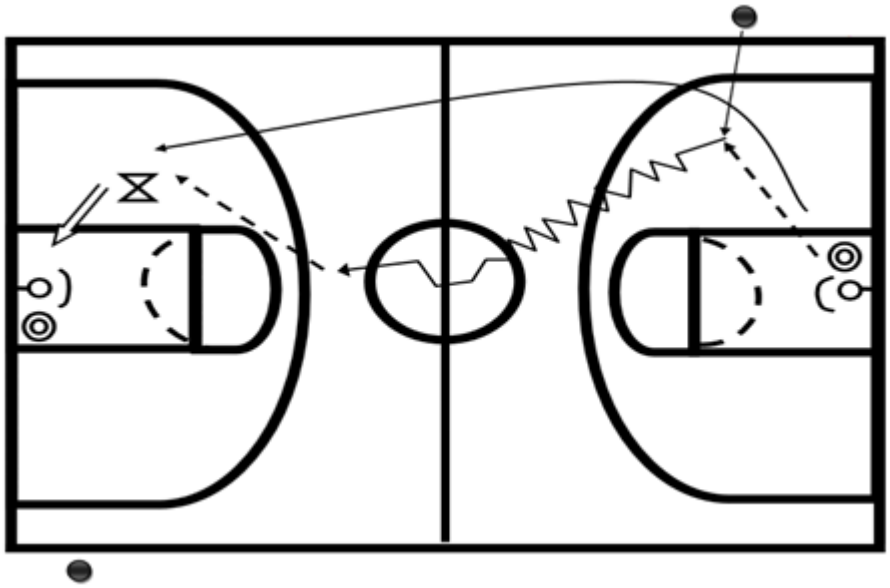
The players stand on the right side of the field, towards the end of the field, and the exercise is performed by all players: one player with the ball and one player without. The first player runs forward, and when he crosses the middle of the field, his teammate passes him a long pass, and he starts dribbling to shoot. The passing player runs at full speed behind his teammate, and he goes to the walls behind the marker placed at the top of the free-throw shooting area. He runs to receive a pass from his teammate, dribbles the ball, and shoots. His teammate catches up with him, follows the ball with him, pulls it, and moves to the left. They switch places when starting from the left.



Exercise (5):

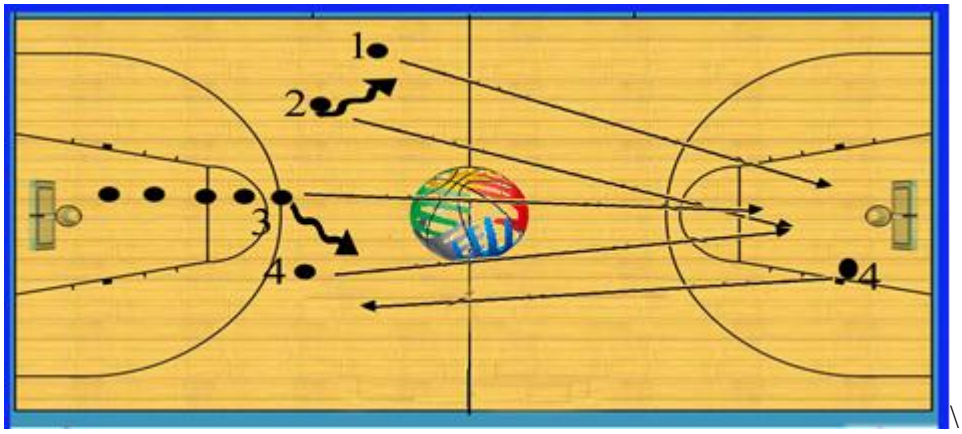
Player (1) stands at the end of the right side of the court, while player (2) stands at the end of the court under the basket opposite player (1) with the ball in his hand. Player (1) moves

towards player (2), who passes the ball to him to dribble towards the middle of the court. Player (2) starts parallel to the sideline towards the other side of the court and towards the basket. When he reaches the marker placed in front of him outside the free throw area (zone), player (2) passes the ball again to player (1), who shoots peacefully at the basket. They move in turns to perform the exercise from the other side of the court in the same manner.



Exercise (6):

The work begins with the player following the basket, then passing the ball between the players until the end of the peaceful scoring. The last player begins to shoot from the other side to begin the second attack. The work is repeated (3 x 3) times, and this is one set.



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