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# Utilizing low-intensity interval training exercises to enhance certain physical and skill variables for basketball players aged 14-16

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## Abstract

This study aimed to investigate differences in pre-test and post-test results for the experimental group regarding specific physical and skill variables among basketball players aged 14–16. Additionally, it sought to identify disparities in post-test outcomes between the experimental and control groups within the same age range. The studyers hypothesized the presence of statistically significant variances between pre-test and post-test results for the experimental group across certain physical and skill variables among basketball players aged 14–16. Furthermore, they anticipated statistically significant discrepancies in post-test results between the experimental and control groups within the same age bracket. Employing an experimental approach suited to the study's objectives, the study's population comprised junior players from Kirkuk province, totaling 85 individuals representing 6 sports clubs. The study sample was intentionally drawn from Sulaf Sports Club, encompassing 18 players. Following the exclusion of two players involved in the pilot study, the final sample consisted of 16 players, constituting 18.82% of the original population. These participants were randomly assigned to control and experimental groups, each comprising 8 players. The experimental group underwent network training exercises developed by the studyers, whereas the control group adhered to the coach's conventional training method. The network training exercises were integrated into the primary segment of the training regimen, with a frequency of 3 units per week over an 8-week period..

**Keywords:** Basketball players, Network training, Physical and skill disparities, Experimental group.

## Introduction

The world is currently experiencing rapid advancements in various fields of life, including the sports sector at all levels (administrative, organizational, and training). These advancements involve the utilization of scientific knowledge and technology to enhance the capabilities and skills of athletes and improve the performance of their teams. Among the sports that have gained significant popularity worldwide is basketball, thanks to its fast-paced and entertaining style of play, particularly the excitement generated when scoring points.

In modern basketball, every team strives to perform at its best, employing strategies to defeat their opponents. This involves closely monitoring the opposing team's movements, closing gaps, and minimizing the time they must make decisions, which is typically 24 seconds. The use of network training in coaching provides scenarios like those encountered in modern basketball. The lines that define these boxes within the network represent the opponents, and when the ball goes out of bounds,



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possession is lost. Training in this manner enhances the players' abilities to perform under tight scrutiny, read the game before gaining possession of the ball, and train within restricted and varied areas of the court, also known as the "training network." This type of training helps players develop good habits, make correct decisions at the right time, and adapt to various game situations.

The significance of this study lies in the need to study the impact of proposed exercises using network training and low-intensity interval training on the development of certain physical and skill variables in basketball players aged 14-16. This study aims to improve performance levels and elevate them towards excellence in the game of basketball, recognizing the importance of modern coaching principles and their positive effects on sports outcomes.

**1.2 Study Problem:**

Basketball has witnessed significant and noticeable developments in all aspects, including physical, skill-based, and tactical elements. These advancements have led to changes in the nature of the game, characterized by speed, strength, and high-level technical performance. Despite the evolution of training methods to enhance players' abilities to meet the demands of modern basketball and utilize their latent energy efficiently throughout the game, some coaches have not paid sufficient attention to certain aspects. One of these neglected aspects is training within small and confined areas of the court.

The studyers believe that the development of physical attributes and motor skills requires specific types of exercises conducted within small and constantly changing playing spaces. Therefore, the studyers conducted this study using network training, which involves training within confined areas, and low-intensity interval training. The study problem can be formulated as follows:

- Do exercises using network training and low-intensity interval training contribute to the development of certain physical and skill variables in basketball players aged 14-16?

**1-3 Objectives:**

1. Identify the differences in pre-test and post-test results for the experimental group in certain physical and skill variables of basketball players aged 14-16.

2. Identify the differences in post-test results between the experimental and control groups in certain physical and skill variables of basketball players aged 14-16.

**1-4 Hypotheses:**

1. There are statistically significant differences between the pre-test and post-test results for the experimental group in some physical and skill variables of basketball players aged 14-16.

2. There are statistically significant differences in the post-test results between the experimental and control groups in some physical and skill variables of basketball players aged 14-16.

**1-5 Fields:**

1-5-1 Human Field: Players of Sulaf Sports Club in Kirkuk aged 14-16.

1-5-2 Time Field: June 29, 2023, to August 27, 2023.

1-5-3 Spatial Field: The indoor hall of Sulaf Sports Club in Kirkuk.



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**3- Methodology and Procedures:**

3-1Methodology:

The studyers employed an experimental approach with pre-test and post-test designs for both the experimental and control groups to suit the nature of the study.

**3-2 Population and Sample:**

The study population consisted of junior players in Kirkuk, numbering 85 players representing 6 sports clubs. The studyers intentionally selected a sample from Sulaf Sports Club, comprising 18 players. Two players were excluded due to their participation in the pilot study, resulting in a study sample of 16 players, representing 18.82% of the original study population. These players were randomly divided into control and experimental groups, each consisting of 8 players.

**3-3 Homogeneity and Equivalence of the Sample:**

To ensure the sample's homogeneity, the studyers conducted tests on variables such as height, weight, and age. The values of the variation coefficient for these variables ranged from ±1, as shown in Table 1. Equivalence between the two groups was also confirmed by analyzing various physical and skill variables, as shown in Table 2.

The table (1) shows the homogeneity of the study sample.

| S | Variables | M | SD | Mean | Torsion coefficient |
|---|---|---|---|---|---|
| 1 | **Length (cm)** | 148 | 4.22 | 144 | 0.074 |
| 2 | **Mass (kg)** | 38.87 | 1.82 | 38 | 0.062 |
| 3 | **Age (years)** | 15.42 | 0.41 | 15.3 | 0.053 |

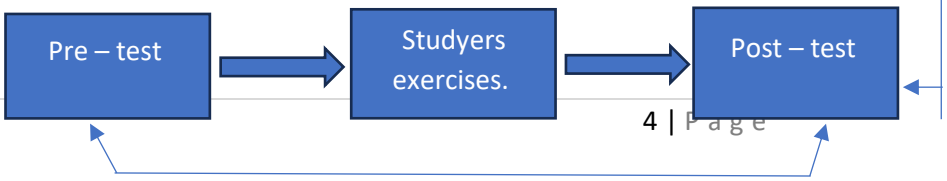
Table (2) illustrates the equivalence of the study sample in physical and skill-related variables.

| S | Statistical characteristics / auditions | Type | Arithmetic mean | Standard deviation | T calculated value | ) sig( | Significance |
|---|---|---|---|---|---|---|---|
| 1 | The motor speed of the right arm. | experimental | 21.9 | 1.211 | 2.1322 | 0.172 | unsig |
| | The motor speed of the left arm | control | 20.8 | 1.181 | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | The motor speed of the right arm | experimental | 21.13 | 1.272 | | | |
| | The motor speed of the left arm | control | 20.22 | 1.213 | | | |
| 3 | The motor speed of both legs. | experimental | 14.1 | 0.710 | 2.621 | 0.136 | unsig |
| | | control | 14.2 | 0.712 | | | |
| 4 | Transitional speed. | experimental | 5.73 | 0.579 | 2.781 | 0.146 | unsig |
| | | control | 5.72 | 0.516 | | | |
| 5 | Agility. | experimental | 12.21 | 0.86 | 2.811 | 0.152 | unsig |
| | | control | 12.43 | 0.89 | | | |
| 6 | Changing direction dribbling. | experimental | 11.121 | 0.528 | 2.422 | 0.144 | unsig |
| | | control | 11.143 | 0.532 | | | |
| 7 | Chest pass. | experimental | 11.511 | 0.726 | 2.611 | 0.128 | unsig |
| | | control | 11.612 | 0.748 | | | |
| 8 | Scoring with a jump shot from under the basket. | experimental | 4.57 | 1.083 | 2.121 | 0.142 | unsig |
| | | control | 4.49 | 1.031 | | | |

1- Control group:


2- Experimental group:



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**Comparison**

Figure (15) illustrates the experimental design.

3-5 The devices and tools used in the study include:

3-5-1 Data collection methods:

1. Tests and measurements.

2. Scientific sources and references.

**3-5-2 Devices used:**

- A computer for data input.

**3-5-2 Tools used:**

1. Electronic device for measuring length to the nearest (1) cm, weight to the nearest (50) grams, measuring tape.

2. Electronic stopwatch.

3. Adhesive tape.

4. Cones.

5. Basketball.

6. Whistle.

7. Basketball court.

**3-6 Physical and Skill Tests Used in the Study:**

The studyers reviewed previous references, sources, and studies to identify the most important tests. After analyzing the content of previous sources and studies, most of them agreed on the following tests:

**3-6-1 Physical Tests included:**

1. Arm Motor Speed Test[1].

2. Leg Motor Speed Test[2].

3. Transitional Speed Test[3].

[1] Auday Mahmoud Zahmar; The Relationship Between Arm Speed and Chest Pass Performance in Youth Basketball Players: (Published Study, Kirkuk University Journal, Volume 9, Issue 2, 2014) Page 168.
[2] Mohamed Subhe Hassanein; Measurement and Evaluation in Physical Education, Vol. 1, 3rd edition (Cairo, Arab Thought Publishing House, 1995), page 27.
[3] Laila El-Sayed Farhat; Measurement and Testing in Physical Education: (Cairo, Al-Ketab Center, 2001) Page 235.

4. Agility Test[4].

3-6-2 Skill Tests Included:

1. Direction Change Dribbling Test[5].

2. Chest Pass Test [6].

3. Jump Shooting Test from under the basket[7].

**3-7 Field Study Procedures:**

**3-7-1 Exploratory Experiment:**

The studyers, along with the assistant study team, conducted the exploratory experiment on two players from the study sample who were excluded during the main experiment. The experiment was conducted on June 29, 2023, with the following objectives:

1. Determine the duration required for the tests.

2. Observe any obstacles encountered by the studyers.

3. Ensure the validity of the study tools used.

4. Assess the competence of the assistant study team.

**3-7-2 Pre-test:**

The studyers conducted pre-tests for the study sample on July 1, 2023, to determine the sample's level for the two study groups in the physical and skill tests.

**3-7-3 The main experiment**

After reviewing most of the sources and previous studies, the studyers prepared exercises to develop some physical and skill variables for young basketball players. The studyers considered some matters related to the application of exercises on the study sample:

- The exercises were implemented for study preparation purposes.

- The execution of the exercises began on 3/7/2023 and continued until 25/8/2023.

[4] Mohamed Thamer Kareem; Contribution of Some Biomechanical, Kinematic, and Physical Variables to the Shooting Performance (Jump and Set-Shot) of Female Adolescents in Some Specialized Schools in Sulaymaniyah Governorate in Basketball: (Unpublished Doctoral Dissertation, Tikrit University, College of Physical Education and Sports Sciences, 2022) Page 35.
[5] Mohammed Mahmoud Abdel Dayem, Mohammed Sabri Hassanein; Basketball Tomorrow: (Cairo, Dar Al-Fikr Al-Arabi, 1999) Page 129.
[6] Ali Salum Jawad; Tests, Measurement, and Statistics in the Field of Mathematics: (Baghdad, Al-Tayf Printing, 2004) Page 177.
[7] Yasser Sabah Qasim; Fundamentals of Basketball, 2nd Edition: (Diyalah, Diyalah Central Printing, 2016) Page 307.



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- Exercise days were on Monday, Wednesday, and Friday of each week.

- The exercise duration ranged from (32, 23, 41) minutes per training session.

- The studyers used the low-intensity interval training method to develop some physical and skill variables for the study sample.

- The principle of progression was applied in the training units.

- The exercises consisted of (27) training units, with (3) units per week.

- The training network exercises were applied in the main part of the training unit.

3-7-4 Post-Tests:

The post-tests for the study sample were conducted on (Saturday), (August 27, 2023), after the completion of the exercises prepared by the studyers. The studyers followed the same method used for the pre-tests.

**3-8 Statistical Methods:**

The studyers used the Statistical Package for the Social Sciences (SPSS) to process the raw data obtained.

4- Presentation and Discussion of Results:

4-1 Presentation and discussion of the results of the pre-test and post-test for the control group considering the statistical data obtained. Table (3) illustrates this.

Table (3):

Results of the significance level for pre-test and post-test physical tests for the control group.

| **S** | **Statistical characteristics** / **auditions** | **Type** | | **Arithmetic mean** | | **Standard deviation** | **T calculated value** | **) sig(** |
|---|---|---|---|---|---|---|---|---|
| | | **M** | **SD** | **M** | **SD** | | | |
| 1 | The kinetic speed of the right arm (number) | 12.9 | 1.221 | 22.4 | 1.19 | 1.871 | 0.121 | unsig |
| 2 | The kinetic speed of the left arm (number) | 20.8 | 1.18 | 20.9 | 1.20 | 1.632 | 0.135 | unsig |
| 3 | The kinetic speed of the legs (number) | 14.1 | 0.710 | 14.6 | 1.17 | 1.921 | 1.137 | unsig |
| 4 | Transitional speed (time) | 5.37 | 0.579 | 5.866 | 0.439 | 1.485 | 0.164 | unsig |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 5 | Agility (time) | 12.21 | 0.86 | 12.47 | 0.88 | 1.231 | 0.122 | unsig |

It is statistically significant if (sig) ≤ (0.05).

From Table (3), it is evident that there were no statistically significant differences in the variables under investigation between the pre-test and post-test assessments for the control group. Although there were differences in the calculated means, they did not reach the level of statistical significance in the pre-test and post-test assessments. The studyers attribute this to the ineffectiveness of the exercises used by the coach during training sessions for the control group in developing these physical variables to the required level among the members of the control group.

2-4 Discussion of the results of the pre- and post-skills tests for the officer group:

Table (4) Results of the significance level for the pre- and post-skills tests for the control group.

| **S** | **Statistical characteristics / auditions** | **Type** | | **Arithmetic mean** | | **Standard deviation** | **T calculated value** | **Sig** |
|---|---|---|---|---|---|---|---|---|
| | | **M** | **SD** | **M** | **SD** | | | |
| 1 | Changing direction dribbling(time) | 11.121 | 0.528 | 10.712 | 0.541 | 2.982 | 0.0.24 | Sig |
| 2 | Chest pass(time) | 11.511 | 0.726 | 10.803 | 1.346 | 22.878 | 0.036 | Sig |
| 3 | Scoring by jumping from under the basket (number) | 4.57 | 1.038 | 4.46 | 1.067 | 2.672 | 0.142 | unsig |

| **S** | **Statistical characteristics / auditions** | **Type** | | **Arithmetic mean** | | **Standard deviation** | **T calculated value** | **Sig** |
|---|---|---|---|---|---|---|---|---|
| | | **M** | **SD** | **M** | **SD** | | | |
| 1 | The kinetic speed of the right arm (number) | 21.13 | 1.27 | 23.15 | 1.32 | 2.971 | 0.041 | sig |
| 2 | The kinetic speed of the left arm (number) | 20.22 | 1.23 | 23.12 | 1.31 | 2.877 | 0.044 | sig |
| 3 | The kinetic speed of the legs (number) | 14.2 | 0.712 | 16.2 | 1.18 | 2.141 | 0.037 | sig |



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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 4 | Transitional speed (time) | 5.72 | 0.561 | 5.122 | 0.438 | 2.131 | 0.048 | sig |
| 5 | Agility (time) | 12.43 | 0.89 | 11.872 | 0.89 | 2.112 | 0.009 | sig |

It is statistically significant if (sig) ≤ (0.05).

According to Table (4), it is evident that there are significant differences between the pre-test and post-test in favor of the post-tests for the control group in the skills of changing direction and chest handling. The studyers attribute the improvement in these two skills in the control group to training on the same skill through repetitions and attempts made by the players in the control group.

4-3 Presentation and Discussion of the Physical Test Results for the Experimental Group:

Table (5) Results of the significance level for the pre-test and post-test physical tests for the experimental group.

It is statistically significant if (sig) ≤ (0.05).

From Table (5), it is evident that there are significant differences in the physical study variables. The studyers attribute this to the effectiveness of the interval training network exercises used in the main part of the training program to develop arm motor speed, transitional speed, and agility. This indicates the validity of regulating the exercises through the network and adhering to training principles using intensity and repetitions that are suitable for the study sample.

Regulating rest and load ensures progress in the training process, as considering these components of the training curriculum leads to improvements in physical variables. This aligns with what (Yousef Lazem, 1999) mentioned, that 'Regulating the training process properly is accompanied by progress in the functioning of the body's systems and, therefore, the development of physical attributes to achieve the best athletic levels[8].

In addition, the use of network training exercises in small spaces to develop physical variables such as motor speed, transitional speed, and agility was in line with the level of individuals in the sample in terms of intensity, size, and rest intervals. It worked to improve these physical variables. This aligns with what (Hara, 1990) mentioned that 'The success of training harmony occurs when the training load is suitable for the players' capabilities and level with appropriate intensity[9].

Furthermore, the network training exercises used had a clear impact on applying resistance to the working muscles during exercise performance in training. This undoubtedly led to an increase in the capability of the muscle fibers during performance in small spaces, resulting in speed in leg and arm movements, transitional speed from one place to another, and agility in moving within these spaces. This, in turn, involved a larger number of muscle fibers during performance, leading to an improvement in the performance of these physical variables.

[8] Yousef Lazem Kamash; Basic Skills in Football - Learning - Training: (Amman, Dar Al-Khaleej Library, 1999) p. 21.

[9] Hara; Principles of Training; Translation: Abd Ali Nsaif: (Mosul, Higher Education Press, 1990) p. 97.

Yaser Ahmed mentions that muscle fibers can demonstrate and produce greater force when changing the type of resistance. Thus, the number of active motor units will increase with the speed of performance and their ability to generate kinetic energy[10].

Consideration of the principle of progression in training load in exercises was an important factor in improving physical variables. The development in physical variables (arm and leg motor speed, as well as transitional speed and agility) is due to the integration in physical performance, which allows freedom of movement in a good and high manner. Motor speed in the arms and legs, transitional speed, and agility are among the most important physical components in some sports activities, requiring changes in speed and body directions in the air and on the ground, followed by rapid and sudden bursts. Hanfi Mahmoud mentions that motor skills are only achieved in the presence of special physical abilities, and as the performance time in any physical test decreases, it leads to an improvement in the players' skill performance[11].

4-4 Presentation and Discussion of the Skill Test Results for the Experimental Group:

Table (6) Significance level results for the pre-test and post-test skill tests for the experimental group.

| S | Statistical characteristics / auditions | Type | | Arithmetic mean | | Standard deviation | T calculated value | Sig |
|---|---|---|---|---|---|---|---|---|
| | | M | SD | M | SD | | | |
| 1 | Changing direction dribbling(time) | 11.143 | 0.532 | 10.141 | 0.529 | 2.892 | 0.028 | sig |
| 2 | Chest pass(time) | 11.612 | 0.748 | 10.144 | 1.248 | 2.668 | 0.048 | sig |
| 3 | Scoring by jumping from under the basket (number) | 4.49 | 1.031 | 4.113 | 1.046 | 2.431 | 0.044 | sig |

It is statistically significant if (sig) ≤ (0.05).

Based on Table (6), it is evident that there are significant differences in the pre-test and post-test skill tests for the experimental group, favoring the post-tests. The studyers attribute the development in these skills to the effectiveness of the network training exercises used in the main part of the training unit. The motor speed of the arms and legs, as well as transitional speed and agility, had a significant impact on improving the skills of changing direction, chest handling, and shooting from under the basket for the members of the experimental group.

[10] Yaser Ahmed Musa; The Effect of a Proposed Exercise for Developing the Special Physical Requirements of Basketball Players: (Unpublished master's Thesis, Helwan University, Faculty of Physical Education, 2000) p. 10.
[11] Hanfi Mahmoud Mukhtar; Fundamentals of Sports Training Program Planning, 1st ed.: (Cairo, Arab Thought House, 1988) p. 36.



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Furthermore, the studyers attribute the observed development in these skills, which are dependent on the study, to the positive relationship between these physical and skill variables. The improvement in speed leads to an improvement in skills, in accordance with what was mentioned by Mohammed Marai (2004), as cited by Hanfi Mahmoud, that strength and speed play a significant role in complex skill performance[12].

The reason for the development of skills under investigation can also be attributed to the development of physical variables such as motor speed, transitional speed, and agility. The development of these physical variables led to an increase in the players' step frequency and consequently an increase in their skill performance speed. The use of network training exercises contributed to the enhancement of the physical aspect for the members of the experimental group, which was then utilized to master the skill aspect. Nabil Al-Sharouk, citing Abdul Khaliq, indicates that skill performance is closely related to specific physical and motor abilities. Skill performance depends on the development of the physical and motor requirements for that performance[13].

Furthermore, the observed improvement in these skills was due to the use of network training exercises performed by the experimental group in training units. These exercises were regulated in terms of intensity, volume, and rest, leading to the development of the core muscles that are crucial for the skills under investigation during their performance. This helped in controlling the motor trajectory of these skills during performance, as well as increasing speed and reducing time. Skill performance in any sport primarily relies on physical performance, particularly in terms of muscle strength and speed[14].

4-5 Presentation and Discussion of the Post-Test Physical Test Results for the Two Study Groups:

Table (7) Significance level results for the post-test physical tests for the two study groups.

| S | Statistical characteristics / auditions | Type | | Arithmetic mean | | Standard deviation | T calculated value | Sig |
|---|---|---|---|---|---|---|---|---|
| | | M | SD | M | SD | | | |
| 1 | The kinetic speed of the right arm (number) | 22.4 | 1.19 | 23.15 | 1.32 | 5.411 | 0.001 | sig |
| 2 | The kinetic speed of the left arm (number) | 20.9 | 1.20 | 23.11 | 1.31 | | | |

[12] Muhammad Marai Ali; The Effect of Interval Training Using Different Time Zones of the First Effort Zone on Some Structural and Skill Variables and Heart Rate for Basketball Players: (Unpublished master's Thesis, University of Mosul, Faculty of Physical Education, 2004) p. 57.

[13] Nabil Mohad Sharouk; The Effect of Aerobic Endurance on several Physical and Skill Variables and Heart Rate Recovery Rate for Basketball Players: (Unpublished Doctoral Dissertation, University of Mosul, Faculty of Physical Education, 2000) p. 62.

[14] Muhannad Abdul-Sattar; Training Methods with Different Approaches to Develop Speed-Strength and Their Effect on Some Fundamental Skills in Basketball: (Unpublished Doctoral Dissertation, University of Baghdad, College of Physical Education, 2005) p. 92.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3 | The kinetic speed of the legs (number) | 14.6 | 0.17 | 16.22 | 1.18 | 4.317 | 0.041 | sig |
| 4 | Transitional speed (time) | 5.866 | 0.439 | 5.122 | 0.438 | 3.207 | 0.008 | sig |
| 5 | Agility (time) | 12.47 | 0.88 | 11.872 | 0.89 | 2.122 | 0.031 | sig |

It is statistically significant if (sig) ≤ (0.05).

Table (7) reveals statistically significant differences in the post-test speed tests for the arms, legs, transitional speed, and agility between the control and experimental groups, in favor of the experimental group. This indicates the effectiveness of the network training exercises in developing the individuals in the experimental group. Proper intensity and repetitions were considered, and regulating the rest of the period had an impact on the training process's progress. Building exercises based on sound and well-thought-out scientific principles leads to the development of the physical variables under investigation.

The studyers attribute this improvement in the variables of motor speed, transitional speed, and agility to the short distances used in the network training and appropriate repetitions with suitable rest periods. All of this influenced the development of these variables because a basketball player requires all these physical variables due to the diverse and evolving situations in the game. They need to perform rapid movements and quickly transition from one place to another to receive the ball or get rid of competitors. Using network training exercises leads to the development of these variables by engaging a larger number of motor units in the body. The motor units controlling arm and leg movement involve large and powerful groups, which ultimately increase performance speed. This aligns with the findings of Abu Al-Ala and Ahmed Nasr al-Din, who stated that 'motor speed is related to muscular work, which is the result of following the instructions of the nervous system, where the muscle provides the required energy for rapid contractions[15].

The studyers attribute the development of the physical variables to the style in which these exercises were performed in different spaces, as well as the diversity between one exercise and another, the exchange of positions, and the rapid movement transitions from one place to another – all of which are factors that contributed to the development of these variables.

Additionally, they utilized structured exercises in terms of intensity, volume, rest periods between repetitions, and groups, while taking into consideration the age of the study sample. Organized training leads to the development of motor speed in the arms and legs, as well as transitional speed and agility. This aligns with what Risan Khreibat mentioned in 1997, that "organized and programmed training, along with the use of regulated intensities and optimal rest periods between repetitions, leads to improvement in performance"[16].

[15] Abu Al-Ala, Ahmed; Ahmed Nasr al-Din; Physiology of Physical Fitness; (Cairo, Arab Thought House, 2003); p. 173.

[16] Risan Khreibat Majid; Applications in Physiology and Sports Training (Amman, Dar Al-Shorouk, 1997) page 481.



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Presenting and Discussing the Results of the Skill Tests for my Study Group for the Secondary Tests:

Table (8) Results of the Significance Level for the Secondary Skill Tests of my Study Group.

| S | Statistical characteristics / auditions | Type | | Arithmetic mean | | Standard deviation | T calculated value | Sig |
|---|---|---|---|---|---|---|---|---|
| | | M | SD | M | SD | | | |
| 1 | Changing direction dribbling(time) | 10.712 | 0.541 | 10.141 | 0.529 | 2.634 | 0.033 | sig |
| 2 | Chest pass(time) | 10.803 | 1.346 | 10.144 | 1.248 | 3.787 | 0.034 | sig |
| 3 | Scoring by jumping from under the basket (number) | 4.46 | 1.067 | 4.113 | 1.046 | 1.461 | 0.041 | sig |

It is statistically significant if (sig) ≤ (0.05).

From Table (8), it is evident that there are statistically significant differences in the secondary skill tests between the control and experimental groups in favor of the experimental group. The studyers attribute the observed improvement in the secondary tests in the experimental group to the impact of exercises within the training network on these specific skills under investigation. These exercises were used in the main part of the training unit.

The development in these physical variables had an influence on skills such as changing direction, chest passing, and shooting under the basket. The performance of a certain number of repetitions over a specific time influenced the development of these physical variables. This may have acted as an incentive to stimulate various motor units due to rapid muscular contractions. This, in turn, leads to the adaptation of the nervous system to employ a greater number of motor units, ultimately contributing to the development of these skills.

Additionally, the observed development during these exercises led to an increase in neuromuscular coordination, which is essential for these skills. As Esaam Abdelkhalek suggests, "Skill performance is closely related to physical capabilities, as mastering skill performance depends on the development of physical and specific motor abilities."[17]

The studyers also attribute the development in the studyed skills to the effectiveness of the training network exercises used by the studyers in the main part of the training unit. These exercises had a direct impact on the physical variables, leading to the development of these skills. Physical exercises actively contributed to enhancing motor coordination, which relies on the integration and alignment of the neuromuscular system to achieve optimal movement performance and its connection

[17] Esaam Abdelkhalek; Sports Training: (Cairo, Dar Al-Maaref Library, 1994).

to technique. This aligns with what Wajih Mahjoub mentioned, emphasizing that performance improvement is fundamentally based on skill repetition and its physical integration[18].

Furthermore, the studyers attribute the progress in skills such as changing direction, chest passing, and shooting from under the basket to the influence of the training network exercises, load regulation, and the gradual increase in intensity and the rest periods employed by the studyers in performing these exercises. The effectiveness of these exercises was reflected in the sample through the volume of repetitions, leading to achieving a state of stability in motor performance by gradually increasing exercise intensity and using appropriate rest intervals between exercises. This, as highlighted by Mohamed Osman, is a clear way to reach optimal skill performance by using training loads based on scientific principles, including intensity, volume, and rest[19].

## 5. Conclusions and Recommendations:

### 5.1 Conclusions:

- The effectiveness of the training network exercises prepared by the studyers for the experimental group had a significant role in developing some physical and skill-related variables among basketball players aged 14-16 years.

- The training network exercises using the low-intensity intermittent training method led to noticeable improvement in certain physical and skill-related variables among the individuals in the experimental group.

- The form and type of exercises had a significant impact on the development of certain physical and skill-related variables in the experimental group.

5.2 Recommendations:

- Utilize training network exercises to enhance specific physical and skill-related variables in basketball players, recognizing their positive contribution to the development of these variables under investigation.

- Conduct similar studies employing different training methods utilizing the training network exercises to develop physical and skill-related variables among basketball players.

- Conduct further study on different age groups to explore the impact of training network exercises on the variables under investigation in this study.

[18] Wajih Mahjoub; "The Science of Movement" (Baghdad, House of Wisdom, 1989), p. 56.
[19] Mohammed Osman; "Motor Learning and Sports Training" (Kuwait, Dar Al-Ilm, 1987), p. 151.



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References

1. Adi Mahmoud Zahmar; "The Relationship between Arm Speed and Chest Passing Performance in Youth Basketball Players" (Published Study, Kirkuk University Journal, Volume 9, Number 2, 2014).

2. Mohamed Sabri Hassanein; "Measurement and Evaluation in Physical Education," Vol. 1, 3rd Edition (Cairo, Dar Al-Fikr Al-Arabi, 1995).

3. Leila El-Sayed Farhat; "Measurement and Testing in Physical Education" (Cairo, Maktabat Dar Al-Kitab, 2001).

4. Mohamed Thamer Kareem; "Contribution of Some Biomechanical, Motor, and Physical Variables to Shooting Skills (Jump Shot and Lay-up) of Female Basketball Players in Specialized Schools in Sulaymaniyah Governorate" (Unpublished Doctoral Thesis, Tikrit University, College of Physical Education and Sports Science, 2022).

5. Mohamed Mahmoud Abdel Dayim, Mohamed Sabri Hassanein; "Basketball Fundamentals" (Cairo, Dar Al-Fikr Al-Arabi, 1999).

6. Ali Saloum Jawad; "Testing and Measurement in the Sports Field" (Baghdad, Matba'at Al-Tayyib, 2004).

7. Yasser Sabah Qasim; "Fundamentals of Basketball," 2nd Edition (Araaek, Central Printing House Diyala, 2016).

8. Yusuf Lazim Kamash; "Basic Skills in Football - Teaching - Training" (Oman, Dar Al-Khalij Library, 1999).

9. Hara; "Training Principles," Translated by: Abd Ali Naseef (Mosul, High Education Printing House, 1990).

10. Yasser Ahmed Moussa; "The Effect of a Proposed Exercise to Develop Special Strength with Speed and Its Impact on Some Basic Basketball Skills" (Unpublished master's Thesis, Helwan University, College of Physical Education, 2000).

11. Hanfi Mahmoud Mukhtar; "Principles of Sports Training," 1st Edition (Cairo, Dar Al-Fikr Al-Arabi, 1988).

12. Mohammad Marai Ali; "The Effect of Intermittent Training Using Different Time Frames of the First Effort Zone on Some Structural and Motor Variables and Heart Rate Recovery Rate in Basketball Players" (Unpublished master's Thesis, University of Mosul, College of Physical Education, 2004).

13. Nabil Mohieddin Ahmed, Ahmed Nasr El-Din; "Physiology of Physical Fitness" (Cairo, Dar Al-Fikr Al-Arabi, 2003).

14. Reisan Khreibat Majid; "Applications in Physiology and Sports Training" (Oman, Dar Al-Sharq, 1997).

15. Esaam Abdelkhalek; "Sports Training" (Cairo, Dar Al-Maaref Library, 1994).

16. Wajih Mahjoub; "The Science of Movement" (Baghdad, House of Wisdom, 1989).

17. Mohammed Osman; "Motor Learning and Sports Training" (Kuwait, Dar Al-Ilm, 1987).

Appendix (1)

Exercises Used in the Main Part of the Training Unit:

1. medical ball throw between two teammates, with (3) meters between them and a ball weight of (2) kilograms.

2. Vertical jump in front of and behind an obstacle with a height of (30) centimeters.

3. Running (10) meters in a square pattern in four directions.

4. Shuttle runs between (6) markers, covering a one-meter distance between each marker.

5. Arm bending and stretching from a lying position on the ground.

6. Double-footed jump over (8) markers, with a half-meter distance between each marker.

7. Running between two markers in a back-and-forth manner, covering (10) meters.

8. Running between four columns arranged in a square pattern, with (5) meters between them.

9. Chest passing the ball between (3) players, with a passing distance of (4) meters.

10. Dribbling between (6) markers in a back-and-forth manner, with (1) meter to the next marker.

11. Repeated shooting under the basket, first from the right side and then from the left side.

12. Throwing a small ball weighing (1) kilogram between (3) players, with a passing distance of (4) meters.

13. Rapid double-footed jumping over a ladder drawn on the ground, measuring (10) meters in length.

14. Running between two markers, covering (10) meters in a back-and-forth manner.

15. Fast-paced running between a set of markers, with (4) meters between the markers.

16. Jumping in place and moving forward and backward over (1) meter.

Appendix (2) Sample Training Unit (Network Training Exercises)

| **S** | **Exercise number** | **Severity %** | **Workout duration** | **Repetition number** | **rest between repetitions** | **groups** | **Comfort between groups** | **Total workout duration** | **Total rest duration** | **Total workout duration with rest** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 80% | 12s | 4 | 30s | 3 | 60s | 144s | 450s | 594s |



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| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 2 | 80% | 10s | 3 | 45s | 3 | 60s | 90s | 450s | 540s |
| 3 | 3 | 80% | 8s | 3 | 60s | 2 | 90s | 48s | 420s | 468s |
| 4 | 4 | 80% | 10s | 2 | 60s | 2 | 90s | 20s | 300s | 320s |

Week 1 Unit 1 Duration of Exercises: (32) minutes

Week 3 Unit 7 Duration of Exercises: (33.6) minutes

| **S** | **Exercise number** | **Severity %** | **Workout duration** | **Repetition number** | **rest between repetitions** | **groups** | **Comfort between groups** | **Total workout duration** | **Total rest duration** | **Total workout duration with rest** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5 | 80% | 10s | - | - | 3 | 60s | 30s | 180s | 210s |
| 2 | 6 | 80% | 8s | 3 | 45s | 3 | 60s | 24s | 450s | 474s |
| 3 | 7 | 80% | 4s | 3 | 60s | 3 | 90s | 36s | 630s | 666s |
| 4 | 8 | 80% | 4s | 3 | 60s | 3 | 90s | 36s | 630s | 666s |

Week 5 Unit 13 Duration of Exercises: (33.25) minutes

| **S** | **Exercise number** | **Severity %** | **Workout duration** | **Repetition number** | **rest between repetitions** | **groups** | **Comfort between groups** | **Total workout duration** | **Total rest duration** | **Total workout duration with rest** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9 | 80% | 10s | 3 | 30s | 3 | 45s | 90s | 315s | 405s |
| 2 | 10 | 80% | 8s | 3 | 45s | 3 | 90s | 42s | 540s | 582s |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 11 | 80% | 20s | 3 | 30s | 3 | 60s | 180s | 360s | 540s |
| 4 | 12 | 80% | 12s | 3 | 30s | 3 | 60s | 108s | 360s | 468s |

Week Seven Unit Twenty-One Exercise Duration: (41.23) minutes

| **S** | **Exercise number** | **Severity %** | **Workout duration** | **Repetition number** | **rest between repetitions** | **groups** | **Comfort between groups** | **Total workout duration** | **Total rest duration** | **Total workout duration with rest** |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 13 | 80% | 6s | 3 | 45s | 3 | 60ثا | 44s | 450s | 494s |
| 2 | 14 | 80% | 4s | 3 | 60s | 3 | 90s | 36s | 630s | 666s |
| 3 | 15 | 80% | 10s | 3 | 60s | 3 | 90s | 90s | 630s | 720s |
| 4 | 16 | 80% | 12s | 3 | 30s | 3 | 60s | 144s | 450s | 594s |



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