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EFFECT OF SPECIAL EXERCISES ON DEVELOPING SOME PHYSICAL ABILITIES, INDICATORS, AND BIOCHEMICALS IN YOUNG BASKETBALL PLAYERS

Mohammad Kadhim Ashour
University of Misan, College of Physical Education and Sports Sciences
Mohamedkadim@uomisan.edu.iq
Nadia Mahdi Mohammed
University of Misan, College of Physical Education and Sports Sciences
nadiam@uomisan.edu.iq
Hussein Fakher Jassim
University of Misan, College of Physical Education and Sports Sciences
Hussein.f.j@uomisan.edu.iq
University of Misan, College of Physical Education and Sports Sciences

Abstract:
The researchers aimed to prepare special exercises to develop some physical and biochemical abilities in young basketball players and to identify the effect of special exercises to develop some physical and biochemical abilities in young basketball players, the researchers used the experimental method to suit the nature of the study. The research community was determined from the young players of the Popular Mobilization Club in basketball, as the total research community reached (25) players for the sports season (2024 – 2025), as for the research sample that was chosen from the research community, it amounted to (20) players, and (20) players were chosen from among them to represent the research sample: (10) players for the experimental group and (10) players for the control group, the training curriculum also continued and was applied to the study sample for a period of (6 weeks), with three training units per week. The researchers used appropriate statistical methods through the Statistical Bag Program (SPSS), in the third chapter, the researchers presented, analyzed and discussed the results using their own tables. As for the most important conclusions, the results showed a clear development in physical abilities after applying special exercises to the members of the experimental group sample, the results showed that special exercises contributed to the development of the biochemical indicators under investigation, there is a significant difference between the pre- and post-test in physical ability tests and biochemical indicators in the experimental and control research sample. As for the recommendations, it is necessary to adopt special exercises as an essential part of training programs for athletes in various games, diversify special exercises to suit the nature of sports activity and the age group of players. Expanding studies in the future to include the psychological, physical and physiological aspects.

Keywords: Special Exercises, Physical Abilities, Biochemical Indicators, Basketball Players.

Introduction

Basketball is a team game that requires high levels of physical fitness and biochemical abilities to ensure optimal performance, especially in young age groups undergoing physical and functional development (Shalom et al., 2023), with the development of sports training methods, the importance of special exercises has emerged as an effective means of improving physical abilities such as strength, speed, and agility (Gottlieb, Shalom, & Calleja-Gonzalez, 2021). In addition to influencing biochemical indicators related to muscle endurance and hormonal balance, theories (Cadegiani & Kater, 2019), rules and foundations of the

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field of sports training helped develop this science at the best levels (Singh, 2023). What proves this are the results achieved by sports teams, which are considered a distinctive characteristic, and the existing experiences and modern research in various aspects, which gave the training process a great deal (Jones, 2022). This is due to the connection between the aspects of sports preparation at the physical, skill and tactical levels, and this is what made the great and necessary interest in the science of sports training (Peráček & Peráčková, 2018). In addition, modern training includes modern and advanced training methods, the aim of which is to increase the difficulty of performance, keep pace with the outside world and the high-level training it has achieved (Arnăutu & Hanţiu, 2020). Developing these abilities not only contributes to improving technical performance but is also an indicator of the quality of physical and functional preparation of players, which reflects positively on the team's results in competitions (Farley et al., 2020). Therefore, studying the effect of scientifically designed special exercises on these variables represents an important step towards building more effective training programs.

Research Problem

Although many coaches rely on many training programs, there is a noticeable decline in the physical and functional performance of young players, especially at critical times of matches, such as the last quarter, where fatigue and decreased concentration appear (Farley et al., 2020). Biochemical indicators such as testosterone and some mineral salts are often not taken into account in preparing training programs, leading to deficiencies in the development of muscular and functional endurance (MacLaren & Morton, 2024). Hence, the research problem stems from the following question:

Do special exercises contribute to improving some physical abilities and biochemical indicators in young basketball players?

Research Objectives:

1. Preparing special exercises to develop some of the physical and biochemical abilities of young basketball players.
2. Identify the effect of special exercises in developing certain physical and biochemical abilities in young basketball players.

Research Hypotheses:

1. There are statistically significant differences between the pre- and post-test, and in favor of the post-test in developing some physical and biochemical abilities in young basketball players.
2. There are statistically significant differences between the post-tests of the control and experimental groups and in favor of the experimental group.

Research Limits:

Human Limits: Popular Mobilization Club basketball players.
Time Limits: from (1/3/2025) to (1/6/2025).
Spatial Limits: The sports hall of the Sports and Scouting Activities Department of Rusafa Education II.

Methodology

Research methodology and field procedures:

The experimental method was used to suit the nature of the study problem.

Community and Research Sample:

The research community was determined from the young players of the Popular Mobilization Club in basketball, as the total research community reached (25) players for the sports season (2024 – 2025), as for the research sample that was chosen from the research community, it amounted to (20) players, and (20)

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players were chosen from among them to represent the research sample: (10) players for the experimental group and (10) players for the control group.

Sample Equivalence

Table 1: Shows the equivalence of the two research groups (control and experimental)

Test name	Measurement Unit	Control		Experimental		T	Sig
		M	SD	M	SD		
The speed-distinctive strength of the two men	Repetition	17.6	0.45	17.4	0.14	0.612	0.555
Transition speed	Second	5.35	0.66	5.22	0.07	0.579	0.571
Agility	Second	10.72	0.719	10.80	0.10	0.303	0.766
Aldosterone	Moll	188	1.541	198	1.236	0.501	0.120
Calcium	L/mmol	9.273	0.252	9.200	0.325	0.558	0.584
Sodium	L/mmol	135.15	1.281	135.20	1.260	-0.099	0.922

Below the significance level (0.05)

Means, Tools and Devices Used:

Research Tools:

1. Arabic sources and references.
2. Observation and experimentation.
3. Tests and measurement.
4. Registration form.

Devices Used:

1. Tape measure.
2. Basketball (10) balls.
3. Stopwatch type (Visuo).
4. Basketball court.
5. (10) barriers of different heights.
6. Scientific manual calculator.
7. Laptop type (hp).
8. World Wide Web.

Field Research Procedures:

Tests and measurements used:

Special physical aptitude tests:

- Front support test (rate) Bend and extend arms (Shnaw) Maximum number for (10 seconds) (Škutāne, Kuplis & Avotiņa, 2025).

Purpose of the test: To measure the speed-characterized force of the arm muscles.

- Running test (30 meters) from the starting point (Benhammou et al., 2021).

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Purpose of the test: To measure the translational velocity.

- Zigzag running test. (Manihuruk et al., 2023).

Purpose of the test: to measure fitness.

Measurement of Biochemical Variables:

A blood sample of each young basketball player (5 cm3) was taken from venous blood to analyze biochemical variables (disterone, calcium and sodium) twice (two draws), as follows: a withdrawal before training and a withdrawal after completing the scheduled period of the experiment, so that the blood samples drawn from the players become (10 cm3), this is done by adopting the scientific method of drawing blood through blood drawing and placing it in the plastic Tube EDTA tubes, in addition to the method of preserving it in the cooling container ((BOX and transporting it to the analysis laboratory, the researchers took care to ensure that the samples arrived in time to the analysis laboratory to conduct tests and measurements on the variables under study.

Exploratory Experiment:

The researchers conducted the survey experiment on Tuesday (3/25/2025) for the purpose of testing the test on a sample of players from outside the research sample, numbering (5) youth basketball players, it aimed to determine the selection of study methods and tools, as well as to extract the scientific foundations of (honesty, stability and objectivity). When conducting it, the two researchers obtained the following:

1. Identify the obstacles that may occur when applying the main experiment.
2. Ensure the validity of the devices used and the suitability of the test for the sample.
3. Find out when to take the study test.
4. The assistant work team defines how the test is applied and what its procedures are.

Scientific Foundations of the Test:

Test Validity:

The ability of a test to measure what it was designed for or the characteristic to be measured (Fukuda, 2019). To confirm the validity of the test, the researchers used the self-validity coefficient, and self-validity is measured by the square root of the test stability coefficient.

Test Stability:

The stability of the test means giving the same results if it is reapplied to the same sample at (two) different times and under similar conditions (Balık & Çakır, 2024). The researchers applied the test to the survey sample, and they are (5) players outside the main experiment sample, then he re-applied the test to the same sample after (7) days and under the same conditions under which the test was applied for the first time.

Test Objectivity:

To identify the objectivity of the test for the study research, and to extract the objectivity of the test results, the two researchers sought to extract the correlation coefficient between the scores of two of the judges. Because the test is considered objective if it gives the same scores in all cases, regardless of who corrects it (Chaabene et al., 2018).

Table 2: Shows the values involved in the reliability, subjective validity, and objectivity coefficients of research tests

No	Tests	Test name	Degree of stability	Self-validity	Objectivity

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1	**Power characteristic of speed**	Front support test	0.88	0.94	0.98
2	**Transition speed**	30m running test from the starting point	0.87	0.89	0.88
3	**Agility**	Zigzag running test	0.86	0.90	0.95

Field Research Procedures:

Pre-Test:

The researchers conducted a pre-test on the research sample on Tuesday and Wednesday (1-2/4/2025).

Exercises:

The researchers applied exercises to develop the physical and biochemical abilities of young basketball players, the special exercises application consists of (6 weeks), and one week contains three training units, i.e. (18) training units distributed over the days of the week (Tuesday, Thursday, Saturday), the training curriculum began on Saturday (4/5/2025) and continued until Tuesday (5/20/2025). The training program included multiple physical and skill exercises, and the exercises contained training aids, it consists of various exercises for speed and strength, characterized by speed and explosive strength, in addition to various skill exercises that serve to correct performance.

Post-Tests:

After completing the special exercises, post-tests were conducted on Friday and Saturday (5/22-23/2025); the same pre-test procedures were applied under the same conditions, time, and place, and with the same assistant work team.

Statistical Methods Used:

The researchers used the statistical bag (SPSS), version (23).

Results

Presentation, analysis, and discussion of the results of pre- and post-tests of the experimental and control research groups in physical and biochemical research variables:

Presentation and analysis of the results of pre- and post-tests of the experimental group in physical and biochemical research variables:

Table 3: Shows the results of pre- and post-tests of the experimental group in physical research variables

Variables	Measurement Unit	pre -tests		post-tests		T	Sig
		M	SD	M	SD		
The speed-distinctive strength of the two men	Repetition	17.6	0.45	22.0	1.06	9.85	0.000 *
Transition speed	Second	5.35	0.66	5.00	0.52	11.18	0.000 *
Agility	Second	10.72	0.719	10.00	0.294	12.45	0.000 *
Aldosterone	Mmol	198	1.236	173	1.851	7.54	0.004 *

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Calcium	L/mmol	9.273	0.252	8.98	0.422	2,54	0.023*
Sodium	L/mmol	135.15	1.281	136.16	1.531	2.67	0.018*

* Significance if the degree of (Sig) > (0.05) is at a degree of freedom of 10-1 = 9

Presentation and Discussion of the Results of the Pre- and Post-Test of the Control Group in the Physical and Biochemical Research Variables:

Table 4: Shows the results of pre- and post-tests of the control group in physical and biochemical research variables

Variables	Measurement Unit	pre-tests		post-tests		T	Sig
		M	SD	M	SD		
The speed-distinctive strength of the two men	Repetition	17.4	0.14	18.6	0.45	3.02	0.000*
Transition speed	Second	5.22	0.07	5.25	0.08	2.89	0.000*
Agility	Second	10.80	0.10	10.60	0.12	2.76	0.000*
Aldosterone	Mmol	188	1.54	162	1.681	4.551	
Calcium	L/mmol	9.200	0.325	9.837	0.325	5.255	0.000*
Sodium	L/mmol	135.20	1.26	139.60	0.742	10.66	0.000*

* Significance if the degree of (Sig) > (0.05) is at a degree of freedom of 10-1 = 9

Presentation of the Results of the Post-Test for the Control and Experimental Research Groups on Some Physical and Biochemical Variables:

Table 5: Shows the results of post-tests of the experimental and control groups on physical and biochemical research variables

Variables	Measurement Unit	pre-tests		post-tests		T	Sig
		M	SD	M	SD		
The speed-distinctive strength of the two men	Repetition	22.0	0.58	18.6	0.14	4.12	0.000*
Transition speed	Second	5.00	0.08	5.25	0.07	3.02	0.000*
Agility	Second	10.00	0.14	10.60	0.10	3.78	0.000*
Aldosterone	Mmol	173	1.85	179	1.62	5.89	0.005*
Calcium	L/mmol	8.987	0.422	9.83	0.325	6.08	0.000*
Sodium	L/mmol	136.16	1.53	139.60	0.742	7.84	0.000*

* Significance if the degree of (Sig) > (0.05) is at a degree of freedom of 20-2 = 18

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Discuss the Research Results:

Through the results shown in the aforementioned tables, the researchers believe that the nature of the special exercises used in the training curriculum, including strength exercises, strength characterized by speed, and jumping exercises during their formation with training methods, has helped increase the muscles' sense of what is required of an ideal executive duty, this was confirmed by the test results comparing the two research groups, this high muscle sensation is a result of neuromuscular coordination, which came as a result of the researchers using exercises that increase this coordination, and thus the result was in favor of the post-test of the study group (the experimental group).

Researchers believe that choosing exercises to suit the playing situations in terms of speed, agility and strength, as basketball is characterized by fast play and requires contractions and relaxation, which is evidence of the player's speed and the safety of his functional devices the time of contraction and relaxation force was as little as possible, which ensured a decrease in the running time of 30 meters, which expresses the individual's ability to exert the highest rates of rapid and explosive force to obtain the lowest rate of acceleration, reflecting the player obtaining the highest speed represented by a decrease in the time of covering this distance (test distance). As most specialized studies indicated that the increase in force is inversely proportional to time and directly proportional to speed, also see its significance in the same variable with speed (Baena-Raya et al., 2021; Haugen, Breitschädel & Seiler, 2019; Sandford, Laursen & Buchheit, 2021). , and the researcher attributes this to the direct contribution of functional devices to performance, so we see compatibility in work between contracted and flat muscles and complete harmony between the working and participating muscles in performing the speed test, as it led to an increase in their speed and a reduction in performance time, this indicates the development and increase in the rates of muscle strength in the arms, which came as a result of the participation and stimulation of the largest number of muscle fibers and the high interconnection between the work of the nervous and muscular system, as well as the decrease in the contraction period, the shorter the muscle contraction period, the greater the muscle strength produced and the higher the rate of contraction speed (Tillin, Pain & Folland, 2018; Hody et al., 2019). Basketball is considered one of the fast sports games, so speed is a necessary and important characteristic that a player must possess. (Gottlieb, Shalom & Calleja-Gonzalez, 2021; Sushko et al., 2019). Speed in basketball is not limited only to fast running, such as arena and field games, but it also requires speed in transporting the ball and speed in taking the appropriate position and place on the field (Feflea, Gherdan & Stupariu, 2023), as well as speed in implementation, this characteristic is necessary because it relates to the player's mastery of basic skills (Farley et al 2020). Speed plays an important role in most sports activities, especially those related to performing a specific skill that requires the speed of contraction of a specific muscle to achieve the goal of movement, such as handling the ball (Xiong & Thadanatthaphak, 2024), given that speed is one of the most important physical qualities that lead to raising the level of motor performance (Cao et al., 2024). As for the biochemical variables, the researchers believe that the emergence of these moral differences, in favor of the members of the experimental group, is due to special exercises, and this indicates the safety of the body's control devices and the suitability of sports exercises, this is consistent with (Kadhim, 2024). The aim of any curriculum and training based on scientific foundations is to bring the athlete's body systems to a high level of metabolic adaptations, which gives them the ability to accomplish (Radu, 2019). In addition to improving nerve and hormonal signals and regulating energy expenditure, all of which are signs of adaptation occurring in athletes (Shalom et al., 2023), as for the significance of the differences in calcium and sodium, researchers believe that the reason is due to the use of special exercises, which contained appropriate training doses that compensated the athlete for the calcium he lost during high physical effort, Ahmadi et al (2024) mentions mineral salts of inorganic elements

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play structural and regulatory roles in the body and also participate in the process of controlling fluid balance within tissues, muscle contraction, nerve functions, enzyme secretion, and red blood cell formation.

Conclusions:

1. The results showed a clear development in physical abilities after applying special exercises to members of the experimental group samples.
2. The results showed that special exercises contributed to the development of the biochemical indicators under investigation.
3. There is a significant difference between the pre- and post-test in physical ability tests and biochemical indicators among the experimental and control research samples.
4. The variety of exercises prepared by the researchers and the nature of the exercises, including strength characterized by speed, maximum strength, agility, explosive strength, and skill exercises, had a positive impact on the development of the research variables.

Recommendations:

1. It is necessary to adopt special exercises as an essential part of training programs for athletes in various games.
2. Diversify special exercises to suit the nature of sports activity and the age group of players.
3. Expanding studies in the future to include the psychological aspect alongside the physical and physiological aspects.
4. Conducting studies on other games and other age groups.

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