



Information Article

Adaptations Induced by Intermittent Hypoxic Conditioning and Variable Resistance Modalities on Complex Offensive Motor Skills in Under-18 Elite Basketball Players

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ARTICLE INFO

ABSTRACT

Keywords:

Hypoxic
Conditioning,
Variable Resistance,
Complex Offensive
Skills.

The significance of this study lies in examining the integration of supplemental hand loads during hypoxic conditioning to enhance complex offensive motor skills among basketball players. The researchers employed a two-group equivalent experimental design suited to the research problem. The sample comprised junior basketball players (under 18 years) from Darbandikhan Sports Club (N = 16). Four players were allocated to pilot testing, and the remaining (n = 12) participants were randomly assigned via lottery into two equivalent experimental groups (n = 6 per group): Experimental Group 1 (utilizing elevation/hypoxic training masks) and Experimental Group 2 (utilizing hypoxic training masks combined with supplemental resistance loads). Homogeneity and baseline equivalence between groups were established. The intervention was implemented at the beginning of the main phase of each training session across three sessions per week for (8) weeks, totaling (24) training sessions. Data were statistically analyzed using SPSS.

The primary conclusions were as follows:

- Hypoxic conditioning significantly improved receiving and high dribbling terminating in a lay-up shot, as well as receiving and high dribbling terminating in a two-point jump shot in Experimental Group 1 from pre- to post-test.
- Combined hypoxic conditioning and variable resistance significantly improved receiving and high dribbling terminating in a lay-up shot, receiving terminating in a three-point jump shot, and receiving and high dribbling terminating in a two-point jump shot in Experimental Group 2 from pre- to post-test.
- Experimental Group 1 exhibited statistically superior improvements over Experimental Group 2 in receiving/high dribbling terminating in lay-up shots and two-point jump shots.
- Experimental Group 2 demonstrated statistically superior performance over Experimental Group 1 in receiving terminating in three-point jump shots on the post-test.

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DOI: <https://doi.org/10.26400/Sep/69/13>



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1. Introduction

Basketball is a team sport characterized by its fast pace and high energy demands, necessitating the integration of specific physical capacities among its practitioners. Consequently, coaches are constantly required to seek the most effective and appropriate methods, devices, and training aids to help players reach the desired level of skill performance.

In this context, numerous researchers have attempted to utilize novel and diverse training devices and tools to establish more effective means than traditional methods. Hypoxic training has emerged as one of the significant training modalities increasingly adopted by researchers and coaches in team sports, owing to its direct impact on athletic skill performance.

Furthermore, other researchers have incorporated various types of resistance into the training process of basketball players to enhance skill performance, introduce variety, and optimize training duration.

The significance of this research lies in combining additional weights attached to the hands during hypoxic training (using an elevation/hypoxic mask) to create a hybrid training approach aimed at improving and developing select complex offensive skills in under-18 (U18) basketball players.

Problem Statement

Through monitoring competition results and observing youth championship matches within Iraqi clubs, the researchers observed noticeable disparities in players' skill performance between the early and final stages of a match. Players exhibited decreased concentration in executing defensive and offensive duties, as well as a decline in scoring efficiency—indicating acute fatigue and strain resulting from match demands. Accordingly, the researchers sought to enhance and develop select basic and complex offensive skills to enable players to maintain a balanced and superior performance throughout the entire match without skill degradation, thereby increasing their chances of victory.

Research Objectives

1. Design training units integrating hypoxic training with various resistances for U18 basketball players.
2. Determine the effect of hypoxic training without resistance on select complex offensive skills among U18 basketball players in the first experimental group between pre- and post-tests.
3. Determine the effect of hypoxic training combined with various resistances on select complex offensive skills among U18 basketball players in the second experimental group between pre- and post-tests.
4. Identify the differences in select complex offensive skills among U18 basketball players in the post-tests between the two research groups (First Experimental Group vs. Second Experimental Group).

Research Hypotheses

1. Statistically significant differences exist in the target variables between the pre- and post-tests for the first experimental group, favoring the post-tests.
2. Statistically significant differences exist in the target variables between the pre- and post-tests for the second experimental group, favoring the post-tests.





3. Statistically significant differences exist in the target variables in the post-tests between the two research groups (First Experimental Group vs. Second Experimental Group).

Research Scope (Domains)

- **Human Domain:** Under-18 (U18) basketball players of Darbandikhan Sports Club.
- **Temporal Domain:** July 15, 2024 – March 1, 2025.
- **Spatial Domain:** The indoor sports hall of Darbandikhan Sports Club.

2. Research Methodology and Field Procedures

2.1 Research Methodology

The researchers utilized the experimental method due to its suitability for the nature of the study, adopting an equivalent two-group design (First Experimental Group and Second Experimental Group). This design is considered one of the most reliable experimental approaches for obtaining precise and accurate results.

2.2 Research Population and Sample

The research population comprised under-18 (U18) basketball players affiliated with clubs competing in the Iraqi Premier League for the 2024–2025 season, totalling **132 players**.

The research sample was purposively selected (*purposive sampling*) from the U18 basketball team of Darbandikhan Sports Club, consisting of **16 players**.

- **Exclusions:** Four (4) players were excluded to conduct pilot studies.
- **Group Assignment:** The remaining sample (12 players) was randomly assigned via drawing lots into two equal experimental groups (6 players per group):
 - **First Experimental Group:** Trained using the hypoxic mask alone.
 - **Second Experimental Group:** Trained using the hypoxic mask combined with added resistance (weights).

Thus, the final sample size comprised **12 players**. Subsequently, tests for homogeneity and equivalence between the two groups were performed.

2.2.1 Homogeneity of the Sample

Prior to implementing the experimental program, the researchers conducted homogeneity testing across the study sample regarding extraneous variables that might influence the results—specifically **body mass, height, chronological age, and training age**—as detailed in **Table (1)**.

Table(1) Homogeneity of the Research Sample Participants

No	Variable	Unit	Arithmetic Mean	Standard Deviation	Coefficient of Variation	Significance
1	Body mass	kg	61.16	10.18	16.64	Homogeneous
2	Stature (height)	cm	172.75	8.49	4.91	Homogeneous
3	Chronological age	years	16.16	0.71	4.39	Homogeneous
4	Training age	years	2.75	0.45	16.36	Homogeneous

Table 1 shows that the research sample was homogeneous with respect to the variables of body mass, stature, chronological age, and training age. The coefficients of variation for these variables were 16.64%, 4.91%, 4.39%, and 16.36%, respectively, all of which fall below the 30% threshold, where “a coefficient of variation approaching 1% indicates a high degree of homogeneity, whereas a value exceeding 30% suggests that the sample is heterogeneous” (Al-Tikriti & Al-Obaidi, 1999, p. 161).





2.2.2 Equivalence between the Two Research Groups

The researchers established equivalence between the members of the two groups prior to implementing the training program on selected composite offensive skills, as shown in Table 2.

Table(2) Equivalence of the Research Sample Participants in Composite Offensive Skills

Composite Offensive Skill	Unit of Measurement	Experimental Group 1		Experimental Group 2		Calculated <i>t</i> -value	<i>p</i> -value	Sig.
		Mean ($\bar{x}$)	SD ($\pm$)	Mean ($\bar{x}$)	SD ($\pm$)			
Lay-up shooting	score/min	4.968	1.479	4.445	0.639	0.794	0.446	NS
Three-point shooting	score/min	0.958	1.618	0.583	0.917	0.949	0.632	NS
Two-point shooting	score/min	2.649	1.428	2.367	0.848	0.416	0.686	NS

*Significant at the 0.05 level.

Table 2 shows that the differences between the two research groups in the composite offensive skills (lay-up shooting, three-point shooting, and two-point shooting) were not statistically significant. The calculated *t*-values were 0.794, 0.949, and 0.416, respectively, and the corresponding *p*-values were greater than 0.05 for all composite offensive skill tests. This indicates that the two groups were equivalent in these skills prior to the experimental intervention.

2.3 Instruments and Equipment Used in the Study

- Indoor basketball court
- Hypoxic training masks (Phantom mask), quantity: 12
- Hand-held weights of various masses
- Cones/markers of different heights
- Basketball balls, quantity: 12
- Electronic stopwatches
- Laser discs (CDs)
- Laptop computer
- Measuring tape
- Colored adhesive tape
- Barriers/hurdles, 3 m in height, quantity: 4
- Loudspeaker for playing the audio file of the Yo-Yo test
- Pens/markers
- Weighing scale for body mass
- Pulse oximeter
- Smartphone
- Fox whistles, quantity: 2
- Wooden box, 20 cm in height
- Iron box, 40 cm in height

2.4 Field Research Procedures

2.4.1 Identification of Selected Composite Offensive Skills under Investigation

To identify selected composite offensive skills, the researchers consulted scientific references and sources specific to basketball. These skills were compiled into a dedicated questionnaire form, which was then presented to experts and specialists in basketball, as well as in testing and measurement and training science, in order to determine the composite offensive skills relevant to basketball players under 18 years of



age. After collecting the questionnaires and tabulating the data, only those composite offensive skills that achieved an agreement rate of 75% or higher were accepted (Bloom et al., 1983, p. 126), as shown in Table 3 (Appendix 1).

Table (3) Agreement among Experts and Specialists regarding the Identification of Selected Composite Offensive Skills and the Corresponding Percentages

No.	Compound Offensive Skills	No. of Experts	No. Agreeing	No. Disagreeing	Percentage of Agreement	Remarks
1	Reception and high dribbling ending with a set (stationary) shot	11	11	0	100%	Approved
2	Reception ending with a jump shot – three-point	11	9	2	81.81%	Approved
3	Reception ending with a jump shot – two-point	11	1	10	9.09%	Excluded
4	Reception and high dribbling ending with a jump shot – two-point	11	10	1	90.90%	Approved
5	Reception ending with a two-handed chest pass	11	6	5	54.54%	Excluded
6	Reception and high dribbling ending with a two-handed chest pass	11	7	4	63.63%	Excluded

2-4-2 Selection of Tests for the Compound Offensive Skills Used in the Research

After the compound offensive skills had been identified by the experts and specialists, the tests corresponding to each skill were determined. The researchers drew on sources and references related to basketball and compiled them into a questionnaire form, which was presented to experts and specialists in sports training, tests and measurement, and basketball. After collecting the questionnaires and processing the data, the tests that obtained an agreement percentage of (75%) or higher were adopted, as shown in Table (4).

Table (4) shows the agreement of the experts and specialists regarding the determination of the tests for the compound offensive skills, and the corresponding percentage of agreement.

No.	Compound Offensive Skills	Tests	No. of Experts	No. Agreeing	No. Disagreeing	Percentage of Agreement	Remarks
1	Reception and high dribbling ending with a set (stationary) shot	Ability to receive and perform high dribbling ending with a set shot (B)	11	9	2	81.81%	Approved
		Ability to receive and perform high dribbling ending with a set shot (C)	11	2	9	18.18%	Excluded
2	Reception ending with a jump shot – three-point	Ability to receive ending with a three-point jump shot (A)	11	10	1	90.90%	Approved
		Ability to receive ending with a three-point jump shot (B)	11	1	10	9.09%	Excluded
3	Reception and high dribbling ending with	Ability to receive and perform high dribbling ending with a two-point jump shot (A)	11	10	1	90.90%	Approved





	a jump shot – two-point	Ability to receive and perform high dribbling ending with a two-point jump shot (C)	11	1	10	9.09%	Excluded
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2-4-3 Tests of the Compound Offensive Skills Used in the Research: (Fares, 2006: 170–198)

1. Test of reception and high dribbling ending with a set (stationary) shot.
2. Test of reception ending with a three-point jump shot.
3. Test of reception and high dribbling ending with a two-point jump shot.

2-4-4 The First Pilot Study

The researchers conducted their first pilot study on (29-8-2024) on a group of (4) players. The aim of the researchers from this study was to determine the following:

- The effectiveness of the (Hypoxic) training masks and the level at which the exercise should begin.
- The suitability of the mask sizes for the players' faces.
- The suitability of the exercises prepared by the researchers with respect to the players' level.
- The suitability of the number of repetitions or durations of the exercises, and the rest intervals between them, for the players.
- The players' ability to use the four levels available on the phantom mask.
- Training with the mask at the fourth level proved to be very difficult for the players; therefore, the researchers excluded the fourth mask level from the main experiment.

2-4-5 The Second Pilot Study

The researchers conducted their second pilot study on (1-9-2024) with the aim of:

- Confirming the validity of the tests, in order to avoid errors that might arise during the implementation of the main experiment.
- Confirming the validity of the devices and tools used.
- Training the assistant work team and having them practice administering the tests and recording the results.
- Determining the time required for each test and for the total set of tests.
- Identifying the ease or difficulty of administering the tests.
- Identifying the difficulties that the researchers and the work team might encounter during the implementation of the main experiment.

2-4-6 Pre-tests

With the assistance of the supporting work team, the researchers conducted the tests on 5/9/2024 (Appendix 2).

2-4-7 The Main Experiment

After completing the pre-measurements of the compound offensive skills, the players were randomly divided into two experimental groups based on the results of the pre-tests (the first experimental group used the hypoxic training mask (phantom mask) only, while the second experimental group used the hypoxic training mask (phantom mask) together with wrist weights during the performance of the exercises). The training program was implemented as follows:

- Implementation of the exercises prepared by the researchers began on Sunday (8-9-2024) and continued until 31/10/2024.
- The interval training method (low-intensity – high-intensity) was used.





- The program was applied during the main part of the training unit, during the special preparation period.
- The target heart rate during rest was 110–120 beats/min.
- The total training duration was (8) weeks.
- The number of weekly training units was (3 units).
- The total number of training units was (24 training units).
- The number of exercises used in the program was (24 exercises).
- The weekly training days were (Sunday, Tuesday, Thursday).
- The exercises were applied for (24–46 minutes) of the main section.
- The training curriculum consisted of (8) macrocycles divided into (two) mesocycles, each mesocycle containing (4) microcycles, with a load-wave pattern of (3:1) in each mesocycle.
- The training load was progressively increased over weeks (1, 2, 3), then reduced in the fourth week in preparation for the training of the fifth week.
- The rest interval between repetitions was determined during the pilot study by measuring heart rate using a (Pulse and Oximeter) device, and ranged between (12–60) seconds.
- The rest interval between sets (transition from one exercise to another) was likewise determined during the pilot study by measuring heart rate using a (Pulse and Oximeter) device, and amounted to (3–5) minutes.
- The number of repetitions ranged from (5–18) repetitions.
- (3) exercises were given in each training unit, and the researcher relied on the principle of player adaptation by repeating the same three exercises throughout the week.
- The optimal intensity used ranged between (60–95%) of the player's maximum capacity.
- To determine the optimal exercise intensity, heart rate per minute (target heart rate) was used, as established through the pilot study.
- A sample of the training units used is presented in Appendix (3).

2-4-8 Post-tests

The post-tests for the research sample members were conducted after the completion of the training program's implementation and following a lapse of three days, on (3/11/2024). The researchers ensured that the organizational conditions for administering the tests were identical to those used in the pre-tests, under the same circumstances and with the same facilities, in terms of the sequence and procedures of the tests, for the purpose of obtaining results of high reliability.

2-5 Statistical Methods

For the purpose of processing the results, the researchers used the SPSS statistical package, through which the following statistical measures were extracted:

- Percentage
- Coefficient of variation
- Arithmetic mean
- Standard deviation
- Paired-samples T-test
- Independent-samples T-test
- Probability value (p-value)





3. Presentation and Discussion of Results

3-1 Presentation of the Results of the Compound Offensive Skills Tests for the First Experimental Group

Table (5) Results of the Arithmetic Mean, Standard Deviation, T-Value, and Level of Significance for the First Experimental Group between the Pre-Test and Post-Test in the Compound Offensive Skills

Tests	Unit	Pre-Test		Post-Test		Statistical Significance		
		Mean	±SD	Mean	±SD	Calculated T-Value	P-Value	Significance
Reception and high dribbling ending with a set (stationary) shot	Score minute	4.968	1.479	11.882	3.343	-8.254	0.000	Significant
Reception ending with a jump shot – three-point	Score minute	0.958	1.618	2.140	1.189	-2.258	0.074	Not Significant
Reception and high dribbling ending with a jump shot – two-point	Score minute	2.649	1.428	4.138	1.554	-3.220	0.023	Significant

*Significant at the significance level (0.05)

3-2 Discussion of the Results of the Compound Offensive Skills Tests for the First Experimental Group

A review of Table (5) reveals an improvement in the level of performance in the compound offensive skills tests (reception and high dribbling ending with a set shot; reception and high dribbling ending with a two-point jump shot) between the pre-test and post-test results, in favour of the post-test results for the first experimental group. This improvement was evident in the arithmetic means of these tests, as well as in the results of the T-test and the significance level values, which showed statistically significant differences between these means in favour of the post-tests.

The researchers attribute this improvement in the results of the compound offensive skills tests (reception and high dribbling ending with a set shot; reception and high dribbling ending with a two-point jump shot) for the first experimental group to a set of factors that contributed to this improvement, such as the players' performance of the special compound exercises ending with shots, which were prepared by the researchers. This is supported by the findings of the study by (Ammar Jabar et al., 2022), which confirm that "compound exercises are effective in developing the physical and technical elements required to enhance the offensive performance of young players, and recommend relying on them in sports training programs" (Ammar et al., 2022: 8199).

Additionally, the special exercises combined with the hypoxic training masks positively affected the improvement in the physical level and in the compound offensive skills mentioned above. These results are consistent with the findings of the studies by (Luay Munshid, 2017) and (Naseem Hussein, 2023), which found that "the use of special hypoxic-style exercises contributes to improving the compound offensive skill ending with a set shot, as well as the compound offensive skill ending with a two-point shot" (Luay, 2017: 105) (Naseem, 2023: 119).

However, despite the noticeable improvement in the arithmetic mean between the pre-test and post-test in the test of (reception ending with a three-point jump shot), this improvement was not sufficient for the test to become statistically significant. The





researchers attribute this to several factors, including the fact that hypoxic mask training has a more pronounced effect on physiological variables and areas requiring physical endurance, whereas transferring this improvement to complex offensive skills such as the three-point shot requires intensive, skill-specific training with a focus on strengthening the arm muscles. This is supported by the findings of the study by (Iyad Mohammed, 2019), which indicate that "improving the three-point shooting skill requires exercises specialized in technical shooting rather than general physiological training" (Iyad, 2019: 34).

3-3 Presentation of the Results of the Compound Offensive Skills Tests for the Second Experimental Group

Table (6) Results of the Arithmetic Mean, Standard Deviation, T-Value, and Level of Significance for the Second Experimental Group between the Pre-Test and Post-Test in the Compound Offensive Skills

Test	Unit	Pre-Test		Post-Test		Statistical Significance		
		Mean	±SD	Mean	±SD	Calculated T-Value	P-Value	Sig.
Reception and high dribbling ending with a set (stationary) shot	Score minute	4.445	0.639	11.080	1.467	-11.499	0.000	Sig.
Reception ending with a jump shot – three-point	Score minute	0.583	0.917	3.874	1.445	-8.934	0.000	Sig.
Reception and high dribbling ending with a jump shot – two-point	Score minute	2.367	0.848	4.253	1.256	-5.811	0.002	Sig.

*Significant at the significance level (0.05)

3-4 Discussion of the Results of the Compound Offensive Skills Tests for the Second Experimental Group

A review of Table (6) reveals an improvement in the level of performance in the compound offensive skills tests (reception and high dribbling ending with a set shot; reception ending with a three-point jump shot; reception and high dribbling ending with a two-point jump shot) between the pre-test and post-test results, in favour of the post-test results for the second experimental group. This improvement was evident in the arithmetic means of these tests, as well as in the results of the T-test and the significance level values, which showed statistically significant differences between these means in favour of the post-tests.

The researchers attribute this improvement in the results of the compound offensive skills tests under study for the second experimental group to a set of factors that contributed to this improvement, such as the players' performance of the varied special compound exercises ending with shots, prepared by the researchers — since the greater the variety of skill-specific exercises for the game, the more positive the results in serving the skills intended to be developed and improved. "The use of varied and purposeful exercises has a positive effect on the development of skills" (Al-Mandalawi, 1990: 284).

The researchers also attribute this improvement to the exercises used in the training program employing hypoxic masks together with the addition of weights to the arms, which led to the development of special endurance capacities, and this in turn was reflected in the skill-related aspect. This is supported by the findings of the study by





(Naseem et al., 2023), which confirm that "hypoxic training is of great importance in developing special endurance capacities (strength endurance and speed endurance)" (Naseem et al., 2023: 14).

This is consistent with the results of the present study, where the special endurance capacities (strength endurance, speed endurance, and speed-strength endurance) of the second experimental group improved, and this improvement in turn influenced skill performance. In this regard, (Mona Abd al-Sattar) confirmed that "the development of skills must be accompanied by a process of developing physical fitness elements (including strength endurance), just as the development of motor skills should be regarded as two parts of a single process" (Mona, 1989: 99).

Furthermore, (Naseem et al., 2024) indicate that "the development of speed-strength influences skill performance by maintaining the level of performance throughout its duration, and improves the results of the compound skill tests ending with a shot" (Naseem et al., 2024: 162).

In addition, the use of additional weights on the arms contributed to improving the compound offensive skills. This is confirmed by the study of (Mohammed, Zahmar, 2025), which found that "the use of additional weights has a positive effect on some of the compound offensive skills of basketball players under 18 years of age" (Mohammed, Zahmar, 2025: 31).

3-5 Presentation of the Results of the Compound Offensive Skills Tests in the Post-Tests between the First and Second Experimental Groups

Table (7) Statistical Parameters for the Post-Tests of the Compound Offensive Skills Under Study for the First and Second Experimental Groups

Test	Unit	First Experimental Group		Second Experimental Group		Statistical Significance		
		Mean	±SD	Mean	±SD	Calculated T-Value	P-Value	Sig.
Reception and high dribbling ending with a set (stationary) shot	Score minute	11.882	3.343	11.080	1.467	0.538	0.602	NS
Reception ending with a jump shot – three-point	Score minute	2.140	1.189	3.874	1.445	-2.268	0.047	NS
Reception and high dribbling ending with a jump shot – two-point	Score minute	4.138	1.554	4.253	1.256	-0.142	0.890	NS

*Significant at the significance level (0.05)

4-6 Discussion of the Results of the Compound Offensive Skills Tests in the Post-Tests between the First and Second Experimental Groups

A review of Table (8) reveals no statistically significant differences between the first and second experimental groups in the offensive skills tests (reception and high dribbling ending with a set shot; reception and high dribbling ending with a two-point jump shot) in the post-tests, as the significance level values of these tests were greater than the significance level (0.05).

The researchers attribute the absence of statistically significant differences in these two tests between the first and second experimental groups to the fact that both groups improved as a result of performing the same special compound exercises within the training program, which led to the development of the special endurance capacities of both groups as well as their compound offensive skills. Furthermore, hypoxic training





positively affected the development of the special endurance capacities of both the first and second experimental groups, which in turn was reflected in the improvement of their skills. This is supported by the findings of the studies by (Naseem Hussein, 2023) and (Adel Hassan, 2024), which confirm that "the hypoxic training method has a positive effect on the development of special endurance capacities (strength endurance and speed endurance) and on the compound offensive skills (the two-point jump shot and the set shot following dribbling)" (Naseem, 2023: 119) (Adel, 2024: 29).

In addition, the use of arm resistance (additional weights) alongside hypoxic training positively affected the special endurance capacities of the second experimental group, which in turn was reflected in the improvement of their skills. This is confirmed by the findings of the study by (Omar, Laith, 2017), which found that "physical development through the use of resistance training is reflected in the development of some compound offensive skills among young basketball players" (Omar, Laith, 2017: 13).

Furthermore, (Al-Sharouk, 2000) points out that "skill performance is closely linked to special physical and motor abilities, as mastery of skill performance depends on the extent to which the physical and motor requirements of that performance have been developed" (Al-Sharouk, 2000: 62).

It is also evident that the second experimental group outperformed the first experimental group in the test of (reception ending with a three-point jump shot) in the post-test. This superiority appeared in the arithmetic mean of that test, as well as in the results of the T-test and the significance level value, which showed a significant difference between the means in favor of the second experimental group in the post-tests.

The researchers attribute this superiority of the second experimental group to the use of additional weights on the arms together with the hypoxic mask during the implementation of the training program. The use of additional resistance on the arms led to the development of arm strength endurance in the second experimental group, giving it an advantage over the first experimental group in the post-tests, and this development was reflected in the three-point jump shot skill. The test of (reception ending with a three-point jump shot) requires the player to perform (5) consecutive, rapid shots from a long distance, and the development of arm strength endurance in the second experimental group helped it outperform the first group — "there is a significant correlation between the skill level of shooting in basketball and the strength of the arms and legs" (Ishraq, 2002: 59).

This is further confirmed by the findings of the studies by (Luay, Mohammed, 2012) and (Ali Namuq, 2015), which state that "the use of various forms of resistance has a positive effect on the development of special physical abilities and compound offensive skills, including the three-point shot" (Luay, Mohammed, 2012: 154) (Ali, 2015: 113).

5. Conclusions and Recommendations

Conclusions:

1. Hypoxic training showed a positive effect on improving the compound offensive skills (reception and high dribbling ending with a set shot; reception and high dribbling ending with a two-point jump shot) in the first experimental group under study.
2. Hypoxic training combined with various forms of resistance showed a positive effect on improving the compound offensive skills (reception and high dribbling ending with a set shot; reception ending with a three-point jump shot; reception





and high dribbling ending with a two-point jump shot) in the second experimental group under study.

3. Hypoxic training proved superior in improving (reception and high dribbling ending with a set shot; reception and high dribbling ending with a two-point jump shot) in the first experimental group compared to the second group in the post-tests.
4. Hypoxic training combined with various forms of resistance proved superior in improving (reception ending with a three-point jump shot) in the second experimental group compared to hypoxic training alone in the first group in the post-test.

Recommendations:

1. Coaches should use hypoxic (oxygen-deficiency) training employing modern masks (Phantom Mask) in order to save effort and time and achieve training objectives.
2. Hypoxic training should be used together with various forms of resistance (additional weights) in the development of compound offensive skills among basketball players.
3. Further studies should be conducted on different age groups of basketball players, including a control group for comparison, in order to deepen the understanding of these mechanisms.

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Appendix (1)

Shows the names of the experts and specialists through whom the most important compound offensive skills and their tests were determined

No.	Name	Academic Title	Workplace	Specialization
1	Mohammed Saleh Mohammed	Prof.	Expert	Coaching / Basketball
2	Fares Sami Yousif Shaba	Prof.	University of Baghdad / College of Physical	Tests and Measurement / Basketball





			Education and Sports Sciences	
3	Hassanein Jumaa Asri	Prof.	University of Kufa / College of Physical Education and Sports Sciences	Coaching / Basketball
4	Hussein Manati Sajid	Prof.	University of Karbala / College of Physical Education and Sports Sciences	Sports Training Physiology / Basketball
5	Yassin Omar Majeed	Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Teaching Methods / Basketball
6	Vian Abd al-Karim Saeed	Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Teaching Methods / Basketball
7	Dunya Najat Rashid	Assist. Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Tests and Measurement / Basketball
8	Rizgar Mohammed Raouf	Assist. Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Sports Training Physiology / Basketball
9	Bipak Mohammed Ali Khan	Assist. Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Physical Fitness / Basketball
10	Ahmed Kareem Latif	Assist. Prof.	University of Al-Muthanna / College of Physical Education and Sports Sciences	Coaching / Basketball
11	Awat Ali Hussein	Assist. Prof.	University of Sulaymaniyah / College of Physical Education and Sports Sciences	Learning / Basketball

Appendix (2)

Shows the members of the supporting work team.

No.	Name	Qualification	Workplace
1	Hajran Nasser Taha	Assistant Lecturer (Ph.D. candidate)	Ministry of Education – Sports Institute in Jamjamal
2	Kamran Kareem Jama Saleh	M.A. in Physical Education	Ministry of Education – Directorate of Education, Karmian
3	Barwa Aziz Hama Saeed	M.A. in Physical Education	Coach at Darbandikhan Academy
4	Zana Abdulaziz Mohammed	B.A. in Physical Education	Coach at Darbandikhan Club
5	Mohammed Aziz Hama Saeed	B.A. in Physical Education	Coach at Darbandikhan Academy
6	Shwan Mohammed Abd Ali	Fitness Coach	Coach at Darbandikhan Club





Appendix (3)

Training Unit (1)

Week One: Sunday, 8/9/2024

No	Exercise Code	Exercise Objective	Intensity	Exercise Duration (sec)	Repetitions	Rest Between Repetitions (sec)	Rest Between Exercises (sec)	Actual Exercise Time (sec)	Total Volume (min)
1	1	Leg speed endurance, various types of passing, three-point shooting	60–70%	6	14	12	300	540	9
2	2	Leg speed endurance, various types of passing, two-point shooting		6	14	12	300	540	9
3	3	Leg speed endurance, various types of passing, set shooting		10	14	20	0	400	6.40

Total duration of the training unit: (24.40) minutes

