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## Effectiveness of Special Compound Exercises in Developing Speed-Strength and Explosive Power in the Long Jump among the Students

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## ORIGINAL STUDY

# Effectiveness of Special Compound Exercises in Developing Speed-Strength and Explosive Power in the Long Jump among the Students

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## Abstract

This research aims to determine the effectiveness of compound exercises in developing explosive power and force speed in the long jump among students. The research problem lies in the limited use of compound exercises that develop explosive power and force speed during training. The researcher used an experimental design with two groups (experimental and control). The sample included 24 students from Najaf Preparatory School for Mathematical Sciences, who were randomly divided into two groups (experimental and control). Each group consisted of 12 students, representing 49% of the research population. The experimental group underwent compound exercises, which were conducted over eight training sessions. Explosive power and force speed were measured in the research sample, and the researcher drew several conclusions, the most important of which are: The results of post-tests for both the experimental and control groups showed that the statistical significance values (Sig) in the standing broad jump test were (0.001), in the force speed test (0.003), and in the long jump test (0.000). Therefore, all values were less than 0.05, indicating statistically significant differences favoring the experimental group in subsequent tests. Furthermore, the statistical significance values in all tests (explosive power, speed and strength, and long jump) confirm the research hypotheses and their statistical validity. The statistical results (Sig < 0.05) indicate that the combined exercises were more effective than traditional exercises in developing the physical variables under study.

**Keywords:** Combined exercises, Explosive power, Speed and strength, Long jump

## 1. Introduction and the significance of the research paper

School sports are considered the cornerstone and the starting point in shaping any athlete to achieve a high level of performance. Experts and specialists attribute the development in performance levels and the breaking of records in school sports—particularly in the long jump—to the use of various devices, assisting tools, and training methods, as well as well-structured training curricula that enhance the performance of long jump athletes. This progress in athletic achievement and the recording of better results in long jump events has effectively motivated many researchers to conduct scientific studies and continuous research on these accomplishments. Since

the long jump requires a high level of physical efficiency, it is not sufficient to rely solely on traditional training methods to develop athletic achievement and support the training program. This can be achieved through exercises that develop explosive strength and speed-strength using devices and assisting tools that enhance both the physical and technical aspects of performance. Studies indicate that properly designed compound training leads to greater improvement in specific physical abilities and contributes to the development of athletes' achievements (Arhaim, 2024, p. 180). Previous studies have also pointed to the positive effects of compound exercises resulting from the integration of resistance training and skill-based exercises, which stimulate neuromuscular coordination (Mohammed et al., 2021, p. 11). Therefore, the

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importance of this research lies in the use of compound exercises to develop explosive strength and speed-strength in order to reach a high level of performance and consequently achieve better results as a result of this development.

Explosive strength and speed-strength are considered the most important physical components that enable an athlete to achieve success in the long jump. Hence, the research problem lies in the limited use of compound exercises that develop explosive strength and speed-strength during the training process To achieve peak performance physical level and achieve accomplishment. In addition, which limits their level of development and consequently affects the achievement of results.

**Aims of the research paper**

1. Design compound exercises for developing explosive strength and speed-strength for sports preparatory school students.
2. To investigate the effectiveness of explosive power and compound speed-strength exercises on students in the experimental group of sports schools.
3. To determine the effectiveness of the exercises performed by students in the control group of sports schools.
4. Determine which of the two research groups (experimental and control) is superior in terms of development among sports preparatory school students.

**The researcher hypothesized the following:**

1. The proposed exercises demonstrate a greater effectiveness than the post-tests in the experimental group, with the post-tests showing higher results.
2. Traditional exercises demonstrate a greater effectiveness than the final tests in the control group, with the final tests showing higher results.
3. Compound exercises demonstrate a greater effectiveness than traditional exercises.

**2. Research approach and practical procedures**

*2.1. Research method*

In light of the nature of the research problem, the researcher adopted the experimental method using two groups (experimental and control), as it is the most appropriate method for the nature and objectives of the study.

*2.2. Population and research sample*

A sample is a part of the population Chosen according to specific specific decisions accurately To indicate

the original community. The research population consisted of second-stage students at Al-Najaf Preparatory School for Sports Sciences for Boys during the academic year (2025–2026), totaling 47 students distributed into two sections.

The research sample was selected randomly by lottery, which resulted in choosing the second section, consisting of 24 students. The students were randomly divided into two groups by lottery: an applied group of 12 students, and a traditional group of 12 students. Thus, the research sample represented 49% of the total research population.

Students with poor attendance and those participating in the long jump were excluded.

*2.2.1. Homogeneity of the sample*

The researcher used statistical methods to verify homogeneity of the research sample of age, The block, and stature in order to determine whether differences existed as it illustrates in [Table 1](#).

*Table 1. Homogeneity of the research sample.*

No.	Variables	Unit of Measurement	Mean	Standard Deviation	Skewness Coefficient
1	Age	Years	15.3	0.64	0.21
2	Height	Centimeters	168.25	5.42	-0.37
3	Body Mass	Kilograms	61.75	6.18	0.44

*2.2.2. Equivalence of the sample*

To ensure that both groups started from the same baseline and to avoid factors that might influence the experiment, the researcher conducted equivalence testing between the experimental and control groups in: (Explosive power, Speed-strength, long jump), As shown in the display [Table 2](#).

*2.3. Means, tools, and equipment used in the research*

- A weighing scale.
- A 3-meter height measuring tape.
- A 15-meter measuring tape.
- Data recording forms.
- Statistical processing methods.

*2.4. Tests used in the research*

*2.4.1. Standing broad jump test (Ahmed et al., 2023, p. 6–7)*

**Test Name:** Standing Broad Jump.

**Purpose of the Test:** To measure the explosive strength of the leg muscles.

**Tools:** Measuring tape, chalk, recording form.

**Performance Specifications:**

A starting line one meter in length is drawn. The participant stands behind the starting line with feet

Table 2. Results of the pre-tests for the control and experimental groups.

Variables	Group	Test	Mean	Standard Deviation	Significance T-value	Level	Significance
Standing Broad Jump	Experimental	Pre	214.58	12.46	0.49	0.63	Not Significant
	Control	Pre	212.91	11098			
Speed-Strength Test (Leg Muscles)	Experimental	Pre	32.84	2.37	0.56	0.58	Not Significant
	Control	Pre	32.25	2.29			
Long Jump Test Experimental	Experimental	Pre	4.81	0.34	0.61	0.55	Not Significant
	Control	Pre	4.74	0.31			

slightly apart and parallel, ensuring both feet touch the line from the outside. The distance beyond the starting line is marked in points 5 cm apart for a total length of 3 meters.

The participant begins Using the swinging arm movement backward position while bending Bend your knee joints before jumping slightly He leans slightly forward. The learner performs a maximal forward jump by fully extending the knees and hips while applying maximum propulsive force. off with both feet while Pointing the arms forward. The surge. must be performed With the feet together.

Each participant He gets two jumps, the longer one attempt is recorded. Distance measured from starting line To the end point of contact made by any section of the participant's body with Surface. Assessment recorded in centimeters and rounded to the nearest 5 cm.

#### Scoring:

The distance between the starting point and the landing point is recorded. Two attempts are given, and the best result is calculated.

#### 2.4.2. Speed-strength test for leg muscles (Al-Sheikhli & Reda, 2022, p. 32)

**Test Name:** Maximum Distance Hopping Test / 10 seconds.

**Purpose The test aims** to measure speed. -Strength lower limbs.

**Testing tools: timer, whistle,** measuring Adhesive tapes, Registration sheet.

#### Performance Specifications:

The participant He stands after a marked line on the floor. At the whistle, The learner jumps in a defined straight line as fast as possible. The participant is allowed to continue hopping even if they fall.

#### Scoring:

The distance covered by the participant within 10 seconds is recorded. Only one attempt is given.

#### 2.4.3. Long jump test (Alu, 2022, p. 158)

**Purpose of the Test:** To measure long jump distance.

**Tools Used:** Whistle, measuring tape, recording form.

#### Performance Specifications:

The participant stands behind a marked line on the ground. After hearing the whistle, the participant

performs the approach run followed by the long jump.

#### Scoring:

Each student was tested after adjusting the approximate distance to the take-off board. Three attempts were given to each athlete, and the best performance was recorded on the form. The distance was measured to the last mark left by the jumper.

### 2.5. Scientific foundations of the tests

#### 2.5.1. Test validity

To verify the validity of the test, the researcher used the self-validity coefficient. Self-validity is calculated by finding the square root of the test reliability coefficient, as shown in Table 3.

Table 3. Validity, reliability, and objectivity of the spike test.

No.	Skill Test	Validity	Reliability	Objectivity
1	Standing Broad Jump Test	0,91	0,94	0,95
2	Speed–Strength Test for Leg Muscles	0,89	0,91	0,92
3	Long Jump Test	0,93	0,96	0,97

#### 2.5.2. Test reliability

The researcher determined reliability using the test–retest method. The first test was conducted on a group from the research population but outside the main sample, consisting of five (5) students. The test was then repeated seven days after the first test. Table 3 illustrates this.

#### 2.5.3. Test objectivity

To determine the objectivity of the tests used in the research, the researcher used the coefficient of variation to measure objectivity between evaluators' scores. Table 3 illustrates this

### 2.6. Pilot study

The pilot study was conducted on 3/11/2025 at 9:00 a.m. at Al-Najaf Preparatory School for Sports Sciences for Boys, on the research sample. The pilot study aimed to identify potential obstacles that the researcher might face, The time tests take administer

the adopted For measurement, And understanding the sample for him.

## 2.7. Main experiment

### 2.7.1. Pre-tests

The pre-tests were conducted on both the experimental and control groups over two consecutive days (9–10/11/2025) at 9:00 a.m. On the first day, explosive strength and speed–strength tests were administered. On the following day, the long jump test was conducted for the research sample. The test results were then recorded in the designated data collection forms and statistically processed using appropriate statistical methods through the SPSS program.

### 2.7.2. Training program

Based on the findings of the pilot study, the researcher designed special exercises aimed at developing the physical abilities under investigation (explosive strength and speed–strength). These exercises were incorporated into the training units of the experimental group students at Al-Najaf Preparatory School for Sports Sciences for Boys. The program was designed based on relevant sources, references, and the researcher's experience as a physical education teacher. Meanwhile, the control group continued following the previously adopted training curriculum. The proposed exercises were implemented in addition to the technical performance training of the long jump skill. The exercises were distributed across (8) training units, divided into two sessions per week over (4) weeks. The researcher adopted a wave-like training pattern (3–1). The duration of the main part of each training unit ranged between 15 and 20 minutes. Training intensity started at 50% at the beginning of the program and gradually increased to reach 95% by the end of the training units.

### 2.7.3. Post-tests

Post-tests were conducted after completing the training program for both the experimental and control groups over two consecutive days (3–4/12/2025) at 9:00 a.m. On the first day, explosive strength and speed–strength tests were administered. On the second day, the long jump test was conducted under the same conditions as the pre-tests. The results were recorded in the designated forms and statistically processed using appropriate statistical methods through SPSS.

## 2.8. Statistical methods used

The researcher employed several appropriate statistical methods for data analysis, including:

- 1\_ Arithmetic Mean
- 2\_ Median
- 3\_ Standard Deviation
- 4\_ Simple Correlation Coefficient (Pearson)
- 5\_ T-Test

## 3. Presentation, analysis, and discussion of results

### 3.1. Presentation and analysis of pre- and post-test results for the experimental and control groups

#### 3.1.1. Presentation and analysis of pre- and final exams

Table 4 shows differences between the arithmetic means and standard deviations of the pre- and post-tests for both the experimental and control groups. For the Standing Broad Jump Test, the experimental group's pre-test mean was (114.58) And deviating (12.46), The arithmetic mean in the final exam reached (132.91) And deviating (11.38). And the calculated T reached (6.41) with a significance level of (0.001). When compared to the significance level of (0.05), the differences were statistically significant in favor of the Final exam. The mean value of the pre-test for the Standing Broad Jump Test for the control group was (112.91), and the standard deviation was (11.98). The mean value of the post-test was (123.33), and the standard deviation was (11.42). The calculated t-value was (2.47), and the significance level was (0.003). When compared to the significance level of (0.05), the differences appeared to be significant in favor of the post-test for the Standing Broad Jump Test among the research sample of the control group.

For Speed–Strength Test, experimental group's pre-test mean was (32.84) (SD = 2.37), which increased to (36.12) (SD = 2.09) in the post-test. The calculated T-value was (5.88) at a significance level of (0.003), indicating statistically significant differences in favor of the post-test. The control group also showed statistically significant improvement, though with lower T-values. For the Long Jump Test, The mean value of the pre-test for the (speed-strength) test for the control group was (32.25), and the standard deviation was (2.29). The mean value of the post-test was (33.74), and the standard deviation was (0.14). The calculated (t) value was (2.31), and the significance level was (0.004). When compared to the significance level of (0.05), the differences appeared to be significant and in favor of the post-test for the (speed-strength) test for the research sample of the control group.

The experimental group improved from a pre-test mean of (4.81) (SD = 0.34) to a post-test mean of (5.29) (SD = 0.31), with a T-value of (7.02) and significance level (0.000), indicating highly significant differences

Table 4. Pre- and post-test results for the experimental and control groups.

Variables	Group	Test	Mean	SD	Calculated T	Sig. Level	Significance
Standing Broad Jump Test	Experimental	Pre	114.58	12.46	6.41	0.001	Significant
		Post	132.91	11.38			
	Control	Pre	112.91	11.98	2.47	0.003	Significant
		Post	123.33	11.42			
Speed–Strength Test for Leg Muscles	Experimental	Pre	32.84	2.37	5.88	0.003	Significant
		Post	36.12	2.09			
	Control	Pre	32.25	2.29	2.31	0.004	Significant
		Post	33.74	0.14			
Long Jump Test	Experimental	Pre	4.81	0.34	7.02	0.000	Significant
		Post	5.29	0.31			
	Control	Pre	4.74	0.31	2.58	0.002	Significant
		Post	4.92	0.29			

in favor of the post-test. The control group likewise showed significant improvement, though the magnitude of change was smaller than that of Applied Group. The mean score in the pre-test of the long jump test for the control group was (4.74), and the standard deviation was (0.31). The mean score in the post-test was (4.92), and the standard deviation was (0.29). The calculated t-value was (2.58), and the significance level was (0.002). When compared to the significance level of (0.05), the differences appeared to be significant and in favor of the post-test in the long jump test for the research sample of the control group.

### 3.1.2. The explanation of the results of pre-test and post-test for the experimental and control groups

The results presented in Table 4 revealed statistically significant differences between the pre-test and post-test measurements for both the experimental and control groups across all variables (standing broad jump, speed-specific strength, and long jump). The researcher explains this by saying development to effectiveness. From the compound exercises, which combine strength training with motor situations similar to the actual performance. This finding is supported by Abdul-Amir (2021), who stated that compound exercises enhance speed, recruit more motor units, and increase the rate of force production within a short time frame. This aligns with the requirements of the take-off phase in the long jump, which demands generating substantial force during the brief ground contact time (Abdul-Amir, 2021, p. 118).

Furthermore, compound training contributes to improving the efficiency of the central nervous system in transmitting motor signals more rapidly, thereby enhancing speed-specific strength. This improvement can be observed through the significant increase in the ten-second hop test results, which primarily depend on the speed of repeated muscle contractions

against body resistance. Moreover, the enhanced performance in the long jump can be attributed to improved muscular power, leading to a direct increase in jump distance as a result of better take-off angle and push-off time (Al-Shammari, 2023, p. 203).

Regarding the control group, the results indicated statistically significant differences; however, these differences were smaller in magnitude compared to those of the experimental group. This improvement can be explained by the fact that the regular training program undertaken by the students led to a relatively limited enhancement in an activity requiring high explosive power (Al-Jubouri, 2021). This view is also supported by Al-Azzawi (2021), who noted that organizing training load according to the principles of progression and adaptation contributes to effectively developing physical abilities and improves athletic performance efficiency and achievement (Al-Azzawi, 2021, p. 64). Additionally, traditional training often focuses on general skill performance without emphasizing the development of the type of strength associated with muscle contraction time, resulting in relatively limited improvement.

Moreover, developing speed-specific strength requires high intensity, short performance duration, and variation in training load. These elements may not be available to the same degree in traditional programs. Therefore, the improvement observed in the control group reflects the effect of regular training but does not reach the level of neuromuscular adaptation achieved by the compound exercises (Al-Obaidi, 2021, p. 74).

## 3.2. Presentation, analysis, and discussion of the post-test results for the experimental and control groups

### 3.2.1. Presentation and analysis of the post-test results for the experimental and control groups

Table 5 shows the differences between Grade rates and standard deviation values of the Final exam

Table 5. The results of the post-tests for experimental and control groups.

Variables	Group	Test	Mean	Std. Deviaton	t-value	Sig. Level	Sig. Level																				
Standing Long Jump (from stationary position)	Experimental	Post	132.91	11.38	3.74	0.001	Significant																				
	Control	Post	123.33	11.42				Speed–Strength Test of the Leg Muscles	Experimental	Post	36.12	2.09	3.29	0.003	Significant	Control	Post	33.74	2.14	Long Jump Test	Experimental	Post	5.29	0.31	4.02	0.000	Significant
Speed–Strength Test of the Leg Muscles	Experimental	Post	36.12	2.09	3.29	0.003	Significant																				
	Control	Post	33.74	2.14				Long Jump Test	Experimental	Post	5.29	0.31	4.02	0.000	Significant	Control	Post	4.92	0.29								
Long Jump Test	Experimental	Post	5.29	0.31	4.02	0.000	Significant																				
	Control	Post	4.92	0.29																							

for both The applied and traditional groups. In the standing long jump from a stationary position test, the experimental group achieved a post-test mean of (132.91) And deviating (11.38), whereas the control group recorded a post-test mean of (123.33) with a standard deviation of (11.42). The calculated t-value was (3.74), with a significance level of (0.001). These results indicate statistically significant differences in favor of the experimental group in the post-test.

Regarding the speed–strength test, the experimental group obtained a post-test mean of (36.12) And deviating (2.09), while the control group recorded a mean of (33.74) And deviating (2.14). The calculated t-value was (3.29), and the significance level reached (0.003), demonstrating statistically significant differences in favor of the experimental group.

As for the long jump test, the experimental group achieved a post-test mean of (5.29) And deviating (0.31), compared to a mean of (4.92) And deviating (0.29) for the control group. The calculated t-value was (4.02), with a significance level of (0.000). This indicates statistically significant differences in favor of the experimental group in the post-test.

### 3.2.2. Discussion of the post-test results for the control and experimental groups

Table 5 shows the differences between the post-test results of the control and experimental groups, favoring the experimental group in the tests of explosive strength, speed-strength, and achievement. The researcher indicates that the reason for these differences is due to the exercises used. with the experimental group, which included two-foot jumps, single-leg jumps, depth jumps, and horizontal swings using weights, in addition to many other exercises that had a significant and positive impact on long jump performance.

Compound exercises had a positive effect on performance, as well as on organizing work and rest intervals between repetitions and selecting appropriate types of exercises. This contributed to the development of the muscles involved in the long jump and helped students adapt to the exercises and

training loads. Compound exercises that develop explosive strength and speed-strength help the athlete reach maximum possible speed during the approach run. This enables the athlete, upon reaching the take-off board, to generate forward momentum and jump with maximum force to achieve the greatest possible distance upon landing.

Speed-strength is also associated with the neuromuscular system's ability to produce high force in a short period of time, which is a fundamental requirement in sprinting, jumping, and throwing events in athletics (Cormie et al., 2011, p. 125).

Long jump results are This largely depends on the athlete's ability to generate high force in a short time during the take-off phase. The take-off moment represents the transition point from horizontal velocity to effective forward vertical propulsion. This moment combines explosive strength and speed-strength (Yang et al., 2023, p. 1443).

In addition, attention was given to the number of repetitions based on intensity ratios, rest periods proportional to exercise volume, and gradual progression of intensity and training loads similar to the event's requirements. All these factors led to functional adaptations in the body's systems. Such exercises aim to reduce ground contact time after take-off, thereby producing greater horizontal jumping force toward the sand pit to achieve the longest possible distance. This illustrates the difference between complex and traditional training.

The importance of this type of training is further emphasized by the close relationship between maximal muscular strength and explosive performance. Suchomel et al. (2016, p. 1419) indicated that maximal strength forms the foundation upon which explosive power is built, and athletes with higher levels of maximal strength are better able to develop speed-strength when subjected to appropriate training programs. This means that compound exercises not only improve immediate performance response but also produce long-term neuromuscular adaptations that enhance the efficiency of the central nervous system in recruiting high-threshold motor units. This was also confirmed by Hassan (2019, p. 156), who stated that using compound exercises similar in nature to skill performance improves movement

efficiency due to increased neuromuscular adaptation and enhanced motor control, thereby contributing to the development of athletic achievement.

Furthermore, these exercises not only improved strength in its traditional sense, as in conventional training, but also applied this strength within the technical context of the long jump. Compound training contributes to reducing ground contact time during takeoff and increasing the use of elastic energy stored in muscles and tendons, which is reflected in increasing jump distance (Al-Mousawi, 2023, p. 212).

## 4. Conclusions and recommendations

### 4.1. Conclusions

1. The pre- and post-test results for the experimental group showed that the Sig values in the standing broad jump were 0.001, in the speed-strength test 0.003, and in the long jump 0.000. All values were less than 0.05, indicating statistically significant differences favoring the post-tests.
2. The pre- and post-test results for the control group showed that the Sig values in the standing broad jump were 0.003, in the speed-strength test 0.004, and in the long jump 0.002. All values were less than 0.05, indicating statistically significant differences favoring the post-tests.
3. The post-test results for both the experimental and control groups showed that the Sig values in the standing broad jump were 0.001, in the speed-strength test 0.003, and in the long jump 0.000. All values were less than 0.05, indicating statistically significant differences favoring the experimental group in the post-tests.
4. The Sig values in all tests (explosive power, speed-strength, and long jump) confirm the research hypotheses and their statistical validity.
5. The statistical results (Sig < 0.05) indicate that the combined exercises were more effective than traditional exercises in developing the physical variables under study.

### 4.2. Recommendations

1. The researcher recommends the use of compound exercises to develop explosive strength and speed-strength among sports preparatory students in the long jump due to their positive and effective impact.
2. The researcher recommends designing and applying new compound exercises to develop

other physical abilities that serve sports preparatory students in the long jump.

3. The researcher recommends using exercises appropriate to the developmental stage of preparatory school students in sports schools, as they contribute to building future champions in the long jump.

## Author's declaration

### Conflicts of interest

None.

I confirm that all tables and figures in this article were prepared and written by me personally.

### Ethical-clearance

This manuscript was approved by Assistant Teacher. Amjad Hazem Mohammed on (3/6/2026).

### Author's contributions

All contributions to this study were prepared by the researcher, Assistant Teacher Amjad Hazem Mohammed, who developed the main idea and worked on writing and concluding the research, with the help of a number of experts, including Assistant Teacher Samer Ayad Ali, Head of the Translation Department at the College of Languages / University of Kufa, and Dr. Mustafa Adel Rashid, a lecturer in statistics.

### Facilitate the task

This study was supported by the Najaf Preparatory School for Mathematical Sciences for Boys.

### Roles of each researcher in the research

**First researcher:** Assistant Teacher Amjad Hazem Mohammed was responsible for conceptualizing and designing the project, reviewing literature, collecting data, interpreting results, writing the draft, and conducting the final review of the manuscript.

### Funding statement

This research received no external funding.

### Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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## فعالية التمارين المركبة الخاصة في تطوير السرعة والقوة والقدرة الانفجارية في الوثب الطويل لدى الطلاب

امجد حازم محمد

العراق . المديرية العامة لتربية محافظة النجف الاشرف / ثانوية المتفوقين في الكوفة للبنين.

### المستخلص

يهدف هذا البحث إلى تحديد فعالية التمارين المركبة في تطوير القوة الانفجارية وسرعة القوة في الوثب الطويل لدى الطلاب. تكمن مشكلة البحث في محدودية استخدام التمارين المركبة التي تُنمّي القوة الانفجارية وسرعة القوة خلال التدريب. استخدم الباحث تصميمًا تجريبيًا بمجموعتين (تجريبية وضابطة). شملت العينة 24 طالبًا من مدرسة النجف الإعدادية للعلوم الرياضية، تم تقسيمهم عشوائيًا إلى مجموعتين (تجريبية وضابطة). ضمت كل مجموعة 12 طالبًا، ما يُمثل 49% من مجتمع البحث. خضعت المجموعة التجريبية لتمارين مركبة، أُجريت على مدار ثماني جلسات تدريبية. تم قياس القوة الانفجارية وسرعة القوة لدى عينة البحث، وتوصل الباحث إلى عدة استنتاجات، أهمها: أظهرت نتائج الاختبارات اللاحقة لكتنا المجموعتين التجريبية والضابطة أن قيم الدلالة الإحصائية (Sig) في اختبار الوثب العريض من وضع الوقوف كانت (0.001)، وفي اختبار سرعة القوة (0.003)، وفي اختبار الوثب الطويل (0.000). لذا، كانت جميع القيم أقل من 0.05، مما يشير إلى وجود فروق ذات دلالة إحصائية لصالح المجموعة التجريبية في الاختبارات اللاحقة. علاوة على ذلك، تؤكد قيم الدلالة الإحصائية في جميع الاختبارات (القوة الانفجارية، والسرعة، والقوة، والقفز الطويل) صحة فرضيات البحث وصحتها الإحصائية. تشير النتائج الإحصائية (  $Sig <$  0.05) إلى أن التمارين المركبة كانت أكثر فعالية من التمارين التقليدية في تطوير المتغيرات البدنية قيد الدراسة. الكلمات المفتاحية: تمارين مركبة، القوة الانفجارية، السرعة، القوة، القفز الطويل.

الكلمات المفتاحية: التمرينات المركبة ، القوة الانفجارية ، القوة المميزة بالسرعة ، الوثب الطويل.