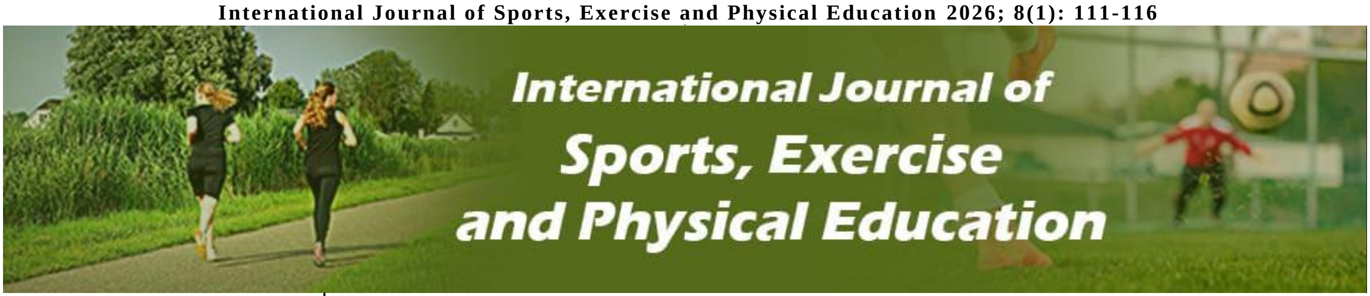


**ISSN Print:** 2664-7281
**ISSN Online:** 2664-729X
**Impact Factor:** RJIF 8.15
IJSEPE 2026; 8(1): 111-116
https://www.sportsjournals.net
Received: 14-11-2025
Accepted: 17-12-2025

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# The effect training of (PAPE) method on improving approach speed, momentum transfer, and long jump effectiveness for young athletes

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**DOI:** https://www.doi.org/10.33545/26647281.2026.v8.i1b.326

**Abstract**
Relevance: This study is relevant to the emergence of pre-exertion neural stimulation training as a contemporary method for optimizing neural activation, prior to engaging in activities designed to enhance an individual's performance. This is so using short-term, high-intensity kinetic stimuli / resistances / contractions which serve to greater efficiency of neural signaling, more motor muscles activation and faster transmission of nerve signals in working muscles. As an answer to the research problem: field observations and scientific diagnosis of long jump competitions, as well as a review of results of very many athletes whose physical & field data we collected prove that many competitors have good run-up speed. Yet, this advantage is not always recognizable in the final jump distance which can be explained by poor momentum transfer at the takeoff and a significant reduction in horizontal speed at the takeoff board. This is mainly due to readiness for neural and neuromuscu- lar insufficiency coordination, and failure to use the speed acquired in the run-up to cre- ate effective take-off force at appropriate instants. Moreover, most existing training paradigms are only aimed at general biomechanical qualities and ignore specific pre-activation neural stimulation for its potential value in motor performance quality enhancement. Therefore, the research problem is formulated as follows: What is the effect of pre-emotional stimulation (PAPE) training on approach velocity, momentum transfer and performance efficiency in long jump?
The objective was to determine the influence of PAPE training on approach velocity, kinetic and kinematic variables at take-off and long jump performance in youth. Hypothesis The researcher hypothesized that PAPE training has an impact on approach speed, momentum transfer and long jump performance in young athletes.
The study sample: included eight young long jumpers (age 17-19) that were members of athletic clubs in Najaf Governorate and enrolled with the Iraqi Athletics Federation for sport season 2025-2026. These players played for two teams: Najaf Club, and Al-Tadhamun Club. They were randomly assigned to two groups of control and experimental.
The study population was selected by lot. The investigator concluded that pre-testing neural stimulation activities had a major positive effect on developing takeoff velocity among long-jumpers by increasing the preparedness of the nervous system and efficiency in recruiting rapid motor units.
Recommendations are: to implement pre-test neural activation exercises in long jumpers, particularly prior the technical performance.

**Keywords:** (PAPE), approach speed, momentum transfer, long jump performance

## Introduction

In the last few decades, athletics, especially long jump has undergone an outstanding development in training techniques inspired by a profound comprehension of neuromuscular integration as the real getting thru way for motor performance and scores. Focus is no longer restricted to the traditional development of biomechanical powers, such as strength and speed but rather extends to contemporary methodologies of neural control mechanisms, effective transfer of momentum, and timing of neural stimulation over time points during performance.

The approach and takeoff phases of the long jump are among the most sensitive and complex phases from a biomechanical and neurological perspective. Optimal performance requires achieving a high approach speed while maintaining the ability to convert horizontal momentum into an efficient vertical component without significant loss of speed. This conversion depends largely on the readiness of the central nervous system, the level of neuromuscular coordination, and the speed of motor response at the moment of takeoff. In this context, pre-training neural stimulation exercises have emerged as a modern training method aimed at raising the level of neural activation before the main performance, through the use of short-term, high-intensity motor stimuli, resistances, or contractions, which lead to improved efficiency of nerve signals, increased recruitment rate of motor units, and improved speed of nerve signal transmission to the working muscles (Tillin, N. A., & Bishop, D. 2020: Naser, *et al.*, 2025: Jerri, *et al.*, 2024: Radhi, & Obaid, 2020) [10, 8, 2, 9].

While this type of training strategy is applied in some sports, the systematic and scientifically-based use of these instruments during long jump performance, as well its relation with important variables such as: speed in the approach, transfer momentum and global efficiency to performance, seems undersized. This paves the way for science to assess the effects of this training in a more reliable way.

## Research problem

Through fieldwork and physical examination of long jump competition, as well as perusal of athletes' performances, we found that a large part of the athletes have good approach velocity. However, this advantage is not always converted in the jump distance attained, given that the momentum transfer during the take-off phase may be inefficient and a significant amount of horizontal speed disappears on the take-off board22. This is mainly due to a lack of neural readiness and neuromuscular coordination and the inability to apply the speed created during takeoff in such a way as to produce powerful take-off forces at the correct instant. Moreover, the current available training is mainly aimed at training general biomechanical abilities and brings a neglect of PE training and in fact its importance for improving quality of motor execution. Therefore, the research problem is defined by the following question: To what extent does pre-excitation training (PAPE) improve approach speed, momentum transfer, and performance efficiency in the long jump?

## Research Objective

Identify the effect of pre-emotional stimulation (PAPE) training on approach speed, momentum transfer, and long jump performance in young athletes.

## Research Hypotheses

- There is an effect of pre-emotional stimulation (PAPE) training on approach speed, momentum transfer, and long jump performance in young athletes.

## Research Fields

- **Human field:** Young athletes participating in the 2025-2026 season.
- **Time field:** (13/1/2025) to (28/4/2025)
- **Spatial field:** The track and field stadium in Najaf Governorate

## Research methodology and field procedures

### Research Methodology

The experimental method, employing a pre-test and post-test design with two groups (experimental and control), was used. This approach was deemed suitable for the nature of the research, which aimed to identify the effect of pre-test neural stimulation training on improving approach speed, momentum transfer, and performance efficiency in the long jump.

## Community and sample research

The research community consisted of eight (8) young long jumpers (aged 17-19) officially registered with athletics clubs in Najaf Governorate, affiliated with the Iraqi Athletics Federation, for the 2025-2026 sports season. These athletes were distributed across two clubs: Najaf Club and Al-Tadhamun Club. They were randomly divided into two groups (control and experimental) by lot. The researcher then used the skewness coefficient before conducting the main experiment on both groups, as shown in Table1.

**Table 1:** Shows the homogeneity of the study sample.

| Variables | Measuring unit | Mean | Median | Std. Deviations | Skewness | Result |
|---|---|---|---|---|---|---|
| Height | Cm | 184.75 | 184.5 | 1.879 | 0.399 | Homogeneous |
| Body mass | Kg | 75.812 | 75.63 | 2.286 | 0.238 | Homogeneous |
| Chronological age | Year | 18.5 | 18.6 | 0.516 | 0.581 | Homogeneous |
| Training age | Year | 4 | 4.1 | 0.564 | 0.531 | Homogeneous |

## Equipment, Tools, and Methods Used in the Study:

### Data Collection Methods

- Arabic and international references and sources.
- Measurements and tests.
- Special forms for documenting player test results.

### Equipment and Tools

- Speedgate (Speed Gates)
- High-speed video camera (120-240 fps)
- Motion analysis software (Kinovea/Dartfish)
- Official long jump measuring tape
- Strength platform (if available)
- Lightweight weights and resistance bands
- Stopwatch
- Data recording forms

## Study Procedures

### Tests Used

**First: Approach Speed Test (Last 10 m) (Mann, R. 2013).**

- **Test Name:** Approach Speed Test in the Last (10) Meters Before Takeoff.
- **Test Objective:** To measure the maximum running speed in the final phase of the approach, which is a crucial indicator of generating the horizontal momentum that influences the takeoff process.
- **Importance of the Test:** Approach speed is one of the most important mechanical determinants of performance in jumping competitions, as it is directly related to the amount of kinetic momentum transferred to the takeoff phase.

**Equipment Used**
- Two photocells
- Measuring tape
- Backup electronic stopwatch
- Flat track surface

**Procedure**
- A (30-40 m) approach course is marked.
- The two photocells are placed at the beginning and end of the last (10 m).
- The athlete runs at maximum speed while maintaining their natural technique.
- The time taken to cover the last (10 m) is recorded. 5. Two attempts are allowed, and the best attempt is counted.
- **Unit of measurement:** second (s).

**Second: Ground Contact Time Test (McMahon, J. J., & Comfort, P.2014)** [7]
- **Test Name:** Ground Contact Time Test during Takeoff
- Test Objective: To measure the duration of foot contact with the ground during takeoff.
- **Test Importance:** Ground contact time reflects the efficiency of the SSC (Supplemental-Contraction Cycle) and the level of neuromuscular excitability.

**Equipment Used**
- Force Plate or Optojump Device
- Electronic Recording System
- Computer for Data Analysis

**Procedure**
- The athlete performs a full jump attempt.
- The duration of foot contact with the platform at the moment of takeoff is recorded.
- The attempt is repeated twice.
- The best attempt (shortest time) is used.
- **Unit of Measurement:** Second (s).

**Third: Take-Off Angle Test (Lees, A., *et al*. 2010)**
- Test Name: Take-Off Angle Test Using Kinematic Analysis.
- Test Objective: To determine the angle at which the body's center of gravity emerges from the ground.
- Test Importance: The optimal take-off angle achieves the best balance between horizontal and vertical momentum, leading to increased jump distance.

**Equipment Used**
- High-speed video camera (≥120 fps)
- Kinovea software
- Tripod
- Ground reference markers

**Procedure**
- The camera is positioned sideways at an angle perpendicular to the movement path.
- The athlete performs a normal jump.
- The moment of release from the ground is analyzed.
- The take-off angle is calculated between the torso axis and the horizontal.
- The best attempt out of three is recorded.
- Unit of Measurement: Degree (°).

**Fourth: Digital Achievement Test (Bosco, C., *et al*. 1983)** [1]
- **Test Name:** Digital Achievement Test in the Long Jump.
- **Test Objective:** To measure the horizontal distance achieved from the take-off board to the nearest mark in the sand.
- **Importance of the Test:** Digital achievement represents the final result of the neurological, mechanical, and technical integration of the performance.

**Equipment Used**
- Official measuring tape
- Standard sand pit
- Approved take-off board

\- Procedure:
- The athlete performs three jump attempts.
- The distance from the take-off board to the nearest mark is measured.
- The best attempt is recorded.
- Unit of Measurement: Meters (m).

**Main Experiment**

**Pre-Test**

After preparing the players and providing a warm-up period of ten to fifteen minutes, along with a thorough explanation of the test, the researcher, with the assistance of the support staff, conducted the pre-test on both research groups (control and experimental) on January 10, 2025, at 12:00 PM on the track and field field at Najaf Sports Club. The test was recorded, skills were assessed, and the values for the research variables were calculated.

**Sample Equivalence**

**Table 2:** Shows the equivalence of the control and experimental groups in terms of the variables.

| Variables | Unit of Measurement | Control | | Experimental | | T value calculated | Level Sig | Type Sig |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Standard deviation | Arithmetic mean | Standard deviation | | | |
| Approach Speed | Second | 1.43 | 0.09 | 1.42 | 0.08 | 0.94 | 0.57 | Non sig |
| Ground Contact Time | Second | 0.20 | 0.02 | 0.19 | 0.02 | 1.32 | 0.34 | Non sig |
| Take-Off Angle | Degree | 15.4 | 2.0 | 15.6 | 2.1 | 0.95 | 0.61 | Non sig |
| Digital achievement | Meter | 6.18 | 0.31 | 6.21 | 0.34 | 0.93 | 0.84 | Non sig |

**Preparation and Implementation of Pre-Physical Neuromuscular Emotional Exercises (PAPE)**

After discussing the objectives of the exercises and their suitability for the sample group, the researcher prepared the Pre-Physical Neuromuscular Emotional Exercises (PAPE) to develop biomotor variables and achieve the training objectives.

**The details of the training units for the Pre-Physical Neuromuscular Emotional Exercises (PAPE) are as follows**

- There are a total of twenty-four training units for the Pre-Physical Neuromuscular Emotional Exercises (PAPE).
- For eight weeks, the specialized training for the Pre-Physical Neuromuscular Emotional Exercises (PAPE) consists of three weekly training units.
- Each training unit (the main section only) lasts between 10 and 12 minutes.
- To determine the intensity of the training units, the maximum intensity (100%) of each exercise was subtracted.
- When implementing the Pre-Physical Neuromuscular Emotional Exercises (PAPE), the researcher used a 1:2 ripple pattern between the daily and weekly training units.

**When applying the pre-training neurostimulation training program, the following steps were followed**

General and specific warm-up (15 minutes)

Pre-training neurostimulation exercises (10-12 minutes), for example

- Light vertical jumps (30-40% of 1RM)
- Short resistance sled pushes
- Fast squats with short contraction time
- Active recovery (3-5 minutes)
- Long jump technique practice
- Cool-down and recovery

**Program Implementation Requirements and Mechanism**

- Neurological stimulation exercises are performed immediately before the technical performance.
- High intensity (85-95%).
- Low volume.
- Focus on quality, not repetition.
- Consideration of individual differences.

**The concept of pre-performance training has two aspects**

- Scientific Concept: Pre-performance training is defined as a set of short-term, high-intensity exercises performed before the main performance. It aims to enhance the readiness of the central and peripheral nervous systems by:
- Increasing the speed of nerve impulse transmission
- Increasing the rate of motor unit recruitment
- Improving neuromuscular synchronization
- Reducing motor response time

**Physiological Basis**

- Increasing the phosphorylation of myosin light chains
- Increasing the sensitivity of nerve receptors
- Improving the speed of muscle contraction
- Improving neural coordination during the act of exertion

**Post-Test**

On April 12, 2025, at 12:00 PM, the researcher conducted tests of the variables at the track and field stadium in Najaf to confirm the magnitude of the effect of the pre-test neural stimulation training under the same conditions as the pre-tests.

**Statistical Methods:** SPSS software was used, and the appropriate tools for the study were selected.

## Results and Discussion

**Presentation and Discussion of the Results of the Pre- and Post-Tests for the Research Variables**

**Table 4:** Shows the differences between the pre-test and post-test for the experimental group in the studied variables.

| ‘ | Unit of Measurement | Pre-test | | Post-test | | T value calculated | Level Sig | Type Sig |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Standard deviation | Arithmetic mean | Standard deviation | | | |
| Approach Speed | Second | 1.42 | 0.08 | 1.28 | 0.06 | 6.207 | 0.001 | Sig |
| Ground Contact Time | Second | 0.19 | 0.02 | 0.14 | 0.01 | 3.41 | 0.003 | Sig |
| Take-Off Angle | Degree | 15.6 | 2.1 | 20.3 | 1.4 | 2.31 | 0.04 | Sig |
| Digital achievement | Meter | 6.21 | 0.34 | 6.78 | 0.29 | 3.59 | 0.004 | Sig |

**Table 5:** Shows the differences between the pre-test and post-test for the control group in the variables under investigation.

| variables | Unit of Measurement | Pre-test | | Post-test | | T value calculated | Level Sig | Type Sig |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Standard deviation | Arithmetic mean | Standard deviation | | | |
| Approach Speed | Second | 1.43 | 0.09 | 1.40 | 0.08 | 3.26 | 0.02 | Sig |
| Ground Contact Time | Second | 0.20 | 0.02 | 0.19 | 0.02 | 2.73 | 0.03 | Sig |
| Take-Off Angle | Degree | 15.4 | 2.0 | 16.1 | 1.9 | 2.65 | 0.04 | Sig |
| Digital achievement | Meter | 6.18 | 0.31 | 6.26 | 0.33 | 3.21 | 0.02 | Sig |

**Table 6:** Shows the significance of the differences between the post-tests of the experimental and control groups in the variables investigated

| Variables | Unit of Measurement | Control | | Experimental | | T value calculated | Level Sig | Type Sig |
|---|---|---|---|---|---|---|---|---|
| | | Arithmetic mean | Standard deviation | Arithmetic mean | Standard deviation | | | |
| Approach Speed | Second | 1.40 | 0.08 | 1.28 | 0.06 | 3.251 | 0.004 | Sig |
| Ground Contact Time | Second | 0.19 | 0.02 | 0.14 | 0.01 | 2.369 | 0.04 | Sig |
| Take-Off Angle | Degree | 16.1 | 1.9 | 20.3 | 1.4 | 3.65 | 0.008 | Sig |
| Digital achievement | Meter | 6.26 | 0.33 | 6.78 | 0.29 | 2.84 | 0.04 | Sig |

**Discussion of Results**

**Approach Speed Results (Last 10 Meters):** Statistical results showed statistically significant differences at the (0.05) level between the pre- and post-test measurements for the experimental group in the time taken to cover the last 10 meters. The time recorded in the post-test was lower compared to the pre-test, indicating an improvement in approach speed. The post-test comparison between the two groups also showed a significant advantage for the experimental group.

**Ground Contact Time findings:** It was found that experimental group significantly decreased ground contact time scores in post-test. The post-test comparison between the two groups further indicated significant difference in favor of the experimental group, suggesting more efficient transition from absorption to propulsion during takeoff. Takeoff Angle Results (momentum transfer) Posttest values of the experimental group are significantly greater than its post test. Values of the maximum average power were close to the optimal mechanical angle for long jump. This was confirmed by the advantage of the experimental group when porformance pre- and posttest values were compared, which suggests an increased ability to rapidly convert horizontal momentum into effective vertical force.

**Digital Achievement Test (Jump Distance):** There was a significant difference between the post-test and pre-test for the experimental group in jump distance. Similar significant differences were observed in favour of the experimental group based on Messin and Jagacinki's post-tests, affirming that efficacy in performance was enhanced as a result of the training intervention.

The direct neurological effect of pre-excitation neural stimulation training are suggested by the researcher to make an important contribution to this observed marked increase in approach speed, when considering the influence that SCEPED (pre-excitation) neurologically based training had on flight performance approach speed. This training increased CNS readiness level, velocity of nerve impulse conduction and the rate of fast motor units synchronisation.

These exercises result in the more efficient neural activation of high-threshold (Type II) muscle fibres, enabling faster rates of proportional force to be produced with a corresponding reduction in time to peak tension. This is manifest by the speed of approach without use of additional mechanical forces. This result agrees with as well as what (Tillin, N. A., & Bishop, D. 2020) [10] suggested: Based on their studies showed that priming training enhanced speed performance through neurological response rather than muscle hypertrophy.

In relation to the talk about ground contact time performance, GCT is competent determinant of nervous system efficiency. The findings suggested that there was a marked reduction on the reaction time from absorption to impulse in the experimental group.

This improvement is due to increased muscle spindles sensitivity, improved reflex function, lowered nerve inhibition under quick contraction operation and eventually force of inborn release impulse.

They are in line with those of (McBride, J. M. *et al*., 2022) [6], that suggest pre-excitation reduces ground contact time and increases explosive qualities of performance.

The significant difference in the discussion of takeoff angle and momentum transfer could be associated with this due to the fact that a large improvement in takeoff angle shown by the experimental group reflects an enhancement of neural timing and muscle coordination between lower limb muscles and trails, which is actually what plays a fundamental role to the efficiency of momentum transfer.

The greater the neural readiness, the more likely it is that an athlete will be able to execute the takeoff at his or her mechanics-optimally moment (causing less loss of horizontal velocity and more vertical momentum).

This finding demonstrates that pre-existing neural drive is a key determinant of power output and quality, which has been previously evidenced by studies such as (Turner, 2021) [11]. Lastly, the researcher considers that the obtained enhancement of performance among the experimental group is attributable to:

- Increased approach speed
- Reduced ground contact time
- Improved takeoff angle

Pre-excitation training contributed to improving the entire motor chain and increasing the efficiency of kinetic energy conversion during performance phases. This led to improved center of mass trajectory during flight and increased jump distance.

These results are consistent with the neuromechanical model of performance described by (Komi, 2000) [3].

To explain the difference between the two groups, the experimental group's superiority over the control group can be attributed to the following:

- Targeting the nervous system, not just the muscles, through training.
- Implementing neural stimulation immediately before the technical performance.
- Reducing training volume while enhancing neural quality.
- Improving neural timing during critical moments of performance.

Thus, the results of this section clearly indicate that pre-excitation training represents an effective training approach for improving performance efficiency in the long jump. This paves the way for drawing precise scientific conclusions and formulating clear practical recommendations.

## Conclusion and Recommendations

### Conclusion

Based on the purposes of study, findings of statistical analyses, and scientific discussion in Chapter Four, the conclusions were drawn by researcher as follows:

- Neural stimulation training before test has remarkable advantage for long jump as it effectively improves the approach speed through enhancing neural readiness and motor units of fast-twitch type recruitment.
- ·Pre-test neural stimulation training helped to decrease the contact time with the ground during take-off, which represented a more rapid transfer of forces from absorb to propel.
- Such training resulted in a higher takeoff angle and increased efficiency of transfer of momentum from the horizontal to the vertical component, with less loss of horizontal speed.
- The interaction of increased Rv*, decreased ground contact round time, and increased takeoff angle resulted in improved Llong and numerical achievement within

the long jump. 5. The experimental group that employed pre-examination neuromuscular stimulation (PES) training showed significantly better results than the control group in all variables tested, indicating that this type of training is effective compared to traditional methods.
- The results of the study showed that achieving better performance in long jump is based on not only developing physical factors, but also on the good quality of neuromechanical use of muscular force and the precision timing of neural activation.
- The findings of the study have verified that PES is a current type of training which can be integrated into jump exercises in track and field, as an effective means.

## Recommendations

- Recommendations Derived from the findings and inferences of the researcher, it is recommended that:
- Implementing PES training in the warm-up to jump and run technique performance of longjumpers.
- The need to focus training for both traditional physical attributes and neuromuscular features.
- Use kinetic analysis to assess the approach and take-off phases regularly, observe that the development of the take-off angle and ground contact time.
- Strictly adhere to the principle of high-intensity, low-volume pre-examination training to prevent nerve strain.
- Conduct trainings for coaches on physiological and biomechanical bases of prelude to EXAM training with a view to correct scientific approach.
- Other track and field disciplines, such as the high jump, triple jump, and sprint running can also use this method of training.

## References


1. Bosco C, Komi PV, Ito A. Mechanical power in jumping. European Journal of Applied Physiology. 1983;50(2):273-282.
2. Jerri ZA, Radhi MN, Oleiwi AH. The effect of Smit-style training on the CPK enzyme, kinetic response speed, and accuracy of the blocking skill for young volleyball players. International Journal of Disabilities Sports and Health Sciences. 2024;7(Special Issue 2):288-299.
3. Komi PV. Stretch-shortening cycle. Journal of Biomechanics. 2000;33(10):1197-1206.
4. Lees A, Fowler N, Derby D. Biomechanics of the long jump. Journal of Sports Sciences. 2010;28(10):1021-1034.
5. Mann R. The mechanics of sprinting and hurdling. Champaign (IL): National Strength and Conditioning Association; 2013. p. 1-168.
6. McBride JM, Nimphius S, Erickson TM. Neuromuscular potentiation. European Journal of Applied Physiology. 2022;122(4):1011-1026.
7. McMahon JJ, Comfort P. Reactive strength and ground contact time. Strength and Conditioning Journal. 2014;36(5):83-89.
8. Naser AA, Dehkordi KJ, Radhi MN, Taghian F, Chitsaz A. The effect of multimodal exercise on the levels of BDNF and GDNF in patients with Parkinson's disease. International Journal of Preventive Medicine. 2025;16:35-42.
9. Radhi MN, Obaid SH. The effect of exercises by metabolic conditioning (MetCon) style on some physiological variables and speed motor response for young volleyball players. Indian Journal of Forensic Medicine and Toxicology. 2020;14(4):2642-2648.
10. Tillin NA, Bishop D. Post-activation potentiation and performance enhancement. Sports Medicine. 2020;50(1):1-14.
11. Turner A. The priming effect in athletic performance. Strength and Conditioning Journal. 2021;43(2):89-96.


## Appendix (1)

**Exercise Model**

**Exercise 1: Vertical jumps with light resistance bands**

- **Objective:** To activate the fast-twitch muscle units
- **Intensity/Resistance:** 30-40% of body weight
- **Time/Repetitions:** 3 x 6
- **Note:** Rest 60 seconds between sets

**Exercise 2: Short 10m sprints with resistance (Sled Push)**

- **Objective:** To improve explosive power and speed
- **Intensity:** 10-20% of body weight
- **Time/Repetitions:** 4 x 10m
- **Note:** Rest 2 minutes between repetitions
- **Note:** These exercises are performed immediately before the technical execution of the long jump. Each stimulation session lasts 10-12 minutes, with high intensity and low volume.

## Appendix (2)

- **Explains the training units**
- Training unit intensity (92%)
- **Month:** First
- **Week:** First
- **Unit number:** (1)
- **Training objective:** Developing research variables

| Exercise Number | Unit Section | Exercise Time (sec) | Repetitions | Sets | Rest Between Repetitions (sec) | Rest Between Sets (sec) | Rest Between Exercises (sec) | Work Time (minute) |
|---|---|---|---|---|---|---|---|---|
| First | Main Section | 15.21 | 4 | 2 | 60 | 90 | 120 | 11.50 |
| Second | Main Section | 14.13 | 3 | 2 | 60 | 90 | 120 | 8.91 |
| Third | Main Section | 14.13 | 2 | 2 | 60 | 90 | 120 | 6.44 |
| Fourth | Main Section | 11.95 ثا | 4 | 1 | 60 ثا | - | - | 3.80 د |