International Journal of Kinesiology & Sports Science
ISSN: 2202-946X
www.ijkss.aiac.org.au

# Pilot Study: Impact of Plyometric Training on Goalkeepers' Ball-Blocking Performance in Football Penalty Situations

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## ARTICLE INFO

*Article history*
Received: August 25, 2024
Revised: March 01, 2025
Accepted: March 21, 2025
Published: April 30, 2025
Volume: 13 Issue: 2

Conflicts of interest: None.
Funding: None.

## ABSTRACT

**Background:** Developing Goalkeeper's performance is imperative to defence the goal. As the Football match's nature needs implementning the skill with strength, and speed. so, the Goalkeeper demands special physical abilities that enabling him the ball blocking skill masterly. **Objetive:** The study aimed to identify the effect of developing some special physical abilities on the goalkeeper's performance level while blocking executed balls from the penalty mark in football using plyometric training. **Methodology:** The experimental approach (continuous training that divided into two phases: General preparation, and Special preparation stage) was adopted for one experimental group by pre/post-measurements. The research sample was deliberately chosen from the goalkeepers of "Al-Talaba Club" football club youth who regularly train in Baghdad University stadium. The proposed training program was applied using plyometric training at three units per week for two months during the preparation period for the season (2021-2022). Physical tests (speed, lateral and frontal flexibility, strength characterized by speed, explosive power, and ability) were conducted. While skill performance tests included (ball blocking skill executed from the penalty mark directed towards the upper corners of the goal). **Results:** The results revealed that there were statistically significant differences at the level of 0.05 between the pre and post measurements in favor of the post-measurement in both physical and skill measurements and tests (under research), **Conclusion:** The training program achieved a positive impact of on the development of the physical abilities of football goalkeepers, due to the employment of plyometric training within the framework of a rationed training program.

**Key words:** Physical Abilities, Plyometric Training, Football, Goalkeeper, Performance Level, Blocking Skill

## INTRODUCTION

The goalkeeper is the team's backbone because of his position, which enables him to defend his goal. In addition to the role he plays, which requires him to defend his goal distinctively and effectively way using his hands and the rest of his body parts inside the penalty area, As the match's nature requires performing the skill with strength, speed, and mastery, besides carrying out his tactical duties, he needs to have special physical abilities that qualify him to master the skill of blocking.

Blocking is one of the most important basic skills of the goalkeeper in football matches because of its direct impact on determining the result. It is noted that the blocking skill requires the availability of some abilities, including the explosive power of the leg muscles, the strength characterized by speed for the legs and arms, and the kinetic speed of the skill. These physical abilities qualify the goalkeeper to reach the ball at the appropriate speed, as "the correlation between muscle strength and kinetic speed is one of the most important requirements for athletic performance of high-level players, and the most important characteristic of these players is their possessing a great deal of strength and speed and their ability to link these two attributes to make a strong, fast kinetic to achieve the difference in level". (Saad, 2024) Therefore, speed indicates of the extent to which the muscular responses harmonize with the neural responses necessary for the timing and kinetic range of the skill under research. Speed is related to physical abilities. Speed is related to the level of muscle strength, as it is not possible to perform quickly without the necessary strength for this speed.

The correlation between speed and strength produces different physical abilities, which is the strength characterized by speed, as the goalkeeper can repeat the performance implementation at a speed and a strength less than the maximum and without an interval between the consisted kinetics of the performance, where the final stage of the finished kinetic is the initial stage of the next kinetic. And this appears when performing the blocking skill for the executed balls from the penalty mark for two consecutive times after blocking, re-bounding the ball, and returning it to the opponent,

Published by Australian International Academic Centre PTY.LTD.

http://dx.doi.org/10.7575/aiac.ijkss.v.13n.2p.20

and then kicking a second time by the opponent towards the goal and blocking for a second time.

Whereas when the performance includes the production of maximum speed and maximum strength, the correlation between speed and strength is at its highest intensity and results in explosive power; thus, the repetition is once, and there is an interval between the performance and its repetition. This appears when performing the jump to the side towards the ball to perform the blocking skill once, as "the necessity of developing explosive power by appropriate scientific methods, the best of which is the plyometric training method." (Zhang et al., 2023) (Esposito et al., 2024) (Aztarain et al., 2024).

"The importance of plyometric training appears in that they work together with the level of high technique to contribute to presenting the required performance level for athletic skills." (Nitzsche et al., 2022) "Also, plyometric training works on developing muscular strength, ability, and explosive power, which is one of the most important components of the jump performance towards the ball. (Bradford et al., 2007).

As the researcher noticed, by watching many football matches of the Iraqi Premier League and following up the matches of European leagues and international championships, that there is a decrease in the performance level of some basic skills of the football goalkeeper, the most important of which is the skill of blocking the balls executed from the corrected penalty mark towards the higher corners of the goal.

And in context of the foregoing, the research problem crystallizes in the low performance level of some basic skills in general by the goalkeeper and the ball blocking skill executed from the penalty mark in particular, which the researcher attributes to the weakness of the jumping stage qualified for the possibility of changing body position on the ground and in the air while flying towards the ball within the correct or ideal technical performance framework. In addition, the low level of some physical abilities enables the goalkeeper to master the performance.

As the football game is one of the games that are directly affected by the physical and skill abilities as a basis for developing the level of the athlete, the physical abilities of the sport of football are of particular importance in the process of sports training because of their great importance in developing the skill capabilities and advancing them to the required levels. (González-Badillo et al., 2014) As this appeared clearly in many countries around the world, it became necessary for observers and researchers in sports affairs to work to find all the important factors and to search for the reasons that led to this development. (Jasimshalaka et al., 2022).

So that, the research aims to 1) identify the effect of using plyometric training in developing some physical abilities of football goalkeepers; and 2) identify the impact of developing some physical abilities on the performance level of some basic skills for football goalkeepers. Thus, the researcher assumes that there is a positive effect of using plyometric training in developing some physical abilities of football goalkeepers, and there is a positive effect of developing some physical abilities on the performance level of some basic skills of football goalkeepers.

Research hypotheses were:

1. There are significant differences between the physical tests (pre- and post-) of the research sample group in favor of the post-test.
2. There are significant differences between the pre- and post-skill tests of the research sample group in favor of the post-test.
3. There are significant differences between the research sample group's pre- and post-flying distance test in favor of the post-test.

## METHOD

### Participants

Deliberately, the research community and its sample were completely selected from the goalkeepers of "Al-Talaba Club," one of the premier teams in the Iraqi Premier League. A sample of four goalkeepers under the age of 19 who regularly train with the young football club of "Al-Talaba Club" in Baghdad were selected to participate in the training program. The research sample was chosen based on the convergence of the players' chronological and training ages. The homogeneity process was applied for sample variables, as shown in Table 1. The basic variables were included: (age, length, weight, training age).

It's noted from Table 1. that the values of the standard deviation were limited between (-0.864, 2.21), while the values of the skewness coefficient were limited between (-1.7, 1.014), thus it is clear that these values are between (±3), and this confirms that the sample is free from the defects of non-normal distributions, which indicates the homogeneity of the study sample in physical tests and measurements.

### Design

Through the reference survey of scientific references, and within the limits of the researcher's knowledge, who has a doctorate degree in sport science, expertise, and objective observation of some football matches, the researcher was

**Table 1.** Statistical significances of the body measurement variables of the experimental group before the experiment. N=4

| | Age | Age training | Length | Weight |
|---|---|---|---|---|
| N Valid | 4 | 4 | 4 | 4 |
| Missing | 0 | 0 | 0 | 0 |
| Mean | 18.275 | 6.750 | 184.75 | 78.375 |
| Median | 18.300 | 6.750 | 184.50 | 78.250 |
| Std. Deviation | 0.5377 | 0.5455 | 1.7078 | 1.3769 |
| Skewness | -0.265 | 0 | 0.753 | 0.323 |
| Std. Error of skewness | 1.014 | 1.014 | 1.014 | 1.014 |

able to identify the proposed training program that relied on using plyometric training to develop physical abilities.

The experimental approach was used for one experimental group through both pre- and post-measurements due to its suitability to the nature of the research. The experimental approach is continuous training that consists of two stages: general preparation (3 weeks) and special preparation (5 weeks) to enhance physical and skill performance.

The proposed training program was performed in the Baghdad University stadium, in Al-Jadriya city, in Baghdad during the preparation period for the 2021-2022 football seasons. It was applied to three training units per week for two months from the 1st of August to the 1st of October 2021. Daily training unit dates were determined based on the match dates with the intention of enhancing the players› vital rhythm during the match dates.

Many physical tests and skill tests were performed to measure numerous variables pre- and post the proposed training programs to determine the improvement rate of participants.

**Instruments**

The physical measurements and skill tests were performed on the Football stadium (natural grass), and by using measurement tape, reel, boxes in different height, medical scal, medical ropes and balls, stopwatch, two plastic rectangles with 50 cm wide and the height are equal to the goal's height, restameter to measure height, rubber belts, tartan floors, chalk, Swedish barriers and seats, training stair, and weight training tools.

**Procedure**

A plyometric training program was applied to the players with three training units per week for two months during the preparation period for the 2021-2022 training season. The pre-measurement of the players was carried out prior to the start of the preparation period for the training season. While the post-measurement was conducted following the end of the same preparation season.

In physical ability tests, many variables were measured, including speed, frontal flexibility, ability, explosive power, and strength, which is characterized by speed (for leg, abdominal, and arm muscles). While in the skill performance tests, attempts at blocking and catching balls and goalkeepers flight distance were measured (Appendix 1, 2). Both the pre- and post-measurements used the identical physical ability tests.

The proposed training program (Appendix 3) aims to improve the football goalkeeper's skills in blocking side balls and increase his flying distance. Also, it aims to improve their physical abilities.

When applying a training program, providing the material capabilities (devices and instruments) was taken into consideration. Also, diversity, suspense in training, and gradual progress in performance from easy to difficult were included. The proposed training was similar to the nature of the performance in the skill of blocking balls; therefore, the muscles worked in a kinetic and time path similar to the original performance.

The most important factor is the appropriate rationing of the training load components to avoid the phenomenon of overload. The training load of the training units was determined and distributed according to the pulse rates and load intensity (Mohamed et al., 2000), as follows:

(a) By maximum pulse rate:

$$\mathrm{Av}(\mathrm{PR}) = \frac{\textit{Maximum pulse rate} \times \textit{Percentage of the required load intensity}}{\textit{Percentage}(100)}$$

Where Av (PR) represents the average pulse rate required in the performance.

(b) Through the maximum performance:

$$\mathrm{Av(T)} = \frac{\textit{The best time for a player to perform} \times \textit{Percentage}\ (100)}{\textit{Percentage}(100)\textit{of the required load intensity}}$$

Where Av (T) represents the average time required in the performance.

**Physical Ability Tests**

In the frontal flexibility test (cm) (Bogalho et al., 2022), the players bend their trunk forward while standing, pushing their fingertips as far as they can towards the ground. They must not bend their knees, and they must fix the end of their fingers at the last point they reach within two seconds. They have made two attempts to record their best performance.

In speed test (50 m running) per second (Indra et al., 2023), the player starts running at an appropriate speed from the starting line when the whistle is heard and ends at the finish line, and the time is recorded through one attempt.

While explosive power test (static vertical jump) (cm) (França et al., 2023) estimates the muscular capacity of the legs by measuring the distance covered by the goalkeeper in the vertical direction while jumping to the highest point.

The player stands with his shoulder next to the wall, holding the chalk with his fingertips, taking the preparatory position for jumping upwards. The gap between the legs is at chest-width level. When the signal is given, the player jumps to the highest possible point, indicating the wall with chalk. Then, the distance is calculated from the ground's zero point to the mark indicated on the wall. The player performs two attempts to calculate the best one.

Plyometric hop tests (Issa et al., 2023) are performed:

For leg muscles (3 hops to the largest distance in the foot) (cm). The player stands at the starting line and, upon hearing the whistle, takes a large step (hop) forward, then hops with the other leg, followed by a third hop with the first leg, provided that the hops are at a high speed. The place where the foot ends for the last hop is indicated to record the maximum distance from the starting line to the end. The best two attempts out of the three are recorded.

For abdominal muscles (sitting from lying down) (10 seconds). When the starting signal is given, the player moves from lying on his back on a sports floor to a sitting position, provided that the feet remain placed on the ground. The performance repeats as quickly as possible for as many repetitions as possible in ten seconds. When the time is up, the count ends, and one attempt is recorded out of two attempts.

For the arm muscles (pushing with the arms from the front support position) (10 seconds). The player takes the prone position after hearing the starting whistle, bends the elbows, and lowers himself till his chest is extremely near the ground. then entirely extends the elbows and bends multiple times at the highest possible speed during the performance to record the largest number of repetitions in 10 seconds.

### Skill Performance Tests

Blocking or catching balls shot from the penalty mark towards one of the goal's corners test (jumping to the side or flying to catch or push the balls away).

Two plastic rectangles are placed within the goal boundaries and on the sides (rectangles 1 and 2) that are 50 cm wide, and the height of them is the same height as the goal, as illustrated in Figure 1. The goalkeeper stands at the middle point of the goal line in a position similar to readiness while blocking the ball from the penalty mark. One player kicks 5 attempts from the penalty mark directed towards the specified rectangles as shown in Figure 1.

Attempts are considered only for the shoot balls into the specified rectangles. The attempt is considered successful if the goalkeeper can block or catch the shot ball, and one point is given; otherwise, zero is given. But if the goalkeeper touches the ball and it enters the goal, half a point is given. The executing player is free to select the direction.

The Flying distance test while jumping to the side towards the ball.

The goalkeeper stands at the exact middle point of the goal line, in a position identical to readiness to block a penalty kick.

A measuring tape connected to a retractable reel fixed on the ground is placed behind the goalkeeper at the exact middle point of the goal. The tape is connected to the goalkeeper's body from behind by a loop fixed to an elastic belt placed around the goalkeeper's waist.


**Figure 1.** Two plastic rectangles placed inside the goal

When executing kicks, the goalkeeper flies towards the ball. Once he lands on the ground, the flying distance is calculated based on the length of the measuring tape that was pulled from the reel fixed on the ground. The flight distance is calculated only for successful attempts and under the conditions of blocking test. If the goalkeeper takes side steps before flying towards the ball, the attempt is considered a failure. Each goalkeeper is given 5 attempts. It is necessary to shoot the ball toward the specified rectangles. Ensure that the measuring tape is returned to the reel before executing.

### Statistical Analysis

The PASW Statistics software, version 18, was used for all statistical analyses such as T-test, arithmetic mean (-x), and standard deviation (± p).

The Paired-sample T-test, which consists of two measures for a single group, was employed to examine the differences between the pre- and post-measurements of the skill tests for football goalkeepers. where NO=N=4, significance of differences is set at free degree N-1, and the level of statistical significance was established at (0.05), while (Sig) degree was less than (0.05).

## RESULTS

It is clear from Table 2 that there are statistically significant variances between the two tests (pre- and post-test), in preference to the post-test. as the calculated (T) value was greater than the tabular (T) value at the 0.05 level. This indicates that there is an improvement in the study samples' physical performance after undergoing the training program. This improvement was attributed to the goalkeepers' regularity within the proposed training program, along with the supported instruments, and due to following the scientific approach in program design by including the physical preparation part.

The applied plyometric training program has a positive effect on improving the physical abilities of football goalkeepers, as follows:

The frontal flexibility test results showed a 56.58% improvement rate.

The improvement in the results of the sprint speed test (50 meters) reached a percentage of 11.50%. The results of the explosive power test (jumping up) achieved 3.93%.

The results of strength, characterized by speed tests for the legs, which are three hops with the foot to the farthest distance, reached 3.47%, while for the abdomen, which is sitting from lying (10 seconds), it was 54.45%, and for the arms, push-ups (slanting prone) (10 s) were 40.94%.

Table 3. regards the goalkeepers' skill tests and shows that there are statistically significant differences between the two tests (pre- and post-test). The result of the post-test was superior to the pre-test's results, as the calculated (T) value was greater than the tabular (T) value at the 0.05 level.

This indicates that the study sample's skill performance obviously improved. Also, it demonstrated that the enhancement in physical skills by applying plyometric training had a

**Table 2.** The significance of differences between the pre and post measurements of physical abilities tests for goalkeepers in football n=4

| Special physical abilities | | | Test | Measurement unit | Premeasurement | | Post measurement | | Differences between pre and post measurements | T-test | Improvement rate |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Mean | Deviation | Mean | Deviation | | | |
| | | | | | -x | ± p | -x | ± p | | | |
| Physical tests | Flexibility | | Frontal flexibility | cm | 6.333 | 10.907 | 9.917 | 10.535 | 3.583 | *15.654 | 56.58% |
| | Speed | | Running 50 m | s | 9.775 | 0.508 | 9.215 | 0.413 | 0.560 | *19.242 | 11.50% |
| | Explosive power | | Jump up from stability | cm | 273.333 | 9.228 | 284.083 | 8.415 | 10.750 | *7.200 | 3.93% |
| | The strength characterized by speed | For legs | 3 hops to the largest distance in the left foot | m | 286.167 | 10.769 | 296.083 | 8.051 | 9.917 | *4.954 | 3.47% |
| | | For abdominal | Sitting from lying (10 s ) | Repetition | 8.417 | 0.793 | 13.000 | 1.348 | 4.583 | *15.938 | 54.45% |
| | | For arms | Pushing with the arms (10 s) | Repetition | 10.583 | 2.466 | 14.917 | 4.833 | 4.333 | *3.278 | 40.94% |

Tabular (T) value at the level of statistical significance (0.05) = 2.101

**Table 3.** The significance of differences between the pre and post measurements of the skill tests for football goalkeepers. (n=4)

| Group & Skill test | | Measurement | Comparison of statistical parameters between pre- and post-test scores | | | | | | Significance of differences | Improvement rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean | Deviation | Mean difference | Deviation difference | T-test | (Sig) | | |
| Empiricism | Balls blocking & catching | Pre | 1.5 | 0.408 | 1.7 | 0.289 | 12.124 | 0.001 | Indicate | 1.167 |
| | | Post | 3.25 | 0.289 | | | | | | |
| | Flight distance | Pre | 5.745 | 0.155 | 0.27 | 0.054 | 10.089 | 0.002 | Indicate | 0.047 |
| | | Post | 6.015 | 0.111 | | | | | | |

N=4, significance of differences at free degree N-1 and the level of statistical significance (0.05): (Sig) degree less than (0.05)

positive impact on improving the skill performance level of some goalkeeping as follows:

The blocking and catching the balls performance skill accuracy test results showed a 1.167% accuracy rate. While the improvement in the test results of the flight distance test while jumping to the side towards the ball was 0.047%.

## DİSCUSSİON

The applied training program had a positive impact on the development of the physical abilities of football goalkeepers. The results of the sprint speed test (50 meters) and the frontal flexibility test have improved, reaching 11.50% and 56.58%, respectively. The training program also achieved an improvement in the explosive power test and strength tests.

Through applying the proposed plyometric training, the improved physical abilities had a direct impact on the performance level of goalkeepers' skills.

The skill of blocking or catching the ball was improved at a rate of 1.167, while the flight distance skill reached 0.047.

The enhancement of physical abilities was attributed to the regularity of goalkeepers within the training program used, which includes various activities and multiple devices and tools. In addition to the following scientific approach, which included a physical preparation part. Let's emphasize that continuing training is one of the basic principles in developing the physical abilities of the practiced activity that presented the training process in an organized scientific framework.

Physical preparation focuses on improving kinetic and physical skills, and the level of these physical skills indicates the individual's ability for advancement (Booth et al., 2016). Also, growing physical speed in football requires addressing all physical abilities, since a wide range of capabilities contribute to performance integration; it upgraded to higher levels (Moreno Arroyo et al., 2016).

These results match with the study results of (Krawczyk et al., 2021), (Asci et al., 2007), (Slaidins et al., 2021), (Jastrzębski et al., 2014), (Kitamura et al., 2020), (Kons, 2023), (Mohamed et al., 2000), and (Saad, 2024) that physical preparation contributes to the development of physical abilities represented in aerobic work, anaerobic work, muscular endurance, strength, ability, speed, and flexibility. Also, it works on developing the physiological aspects related to athletic performance in addition to the psychological aspects of the athlete (Asci et al., 2007).

The results also clarify that applying plyometric training in the training program has an effective impact on the development of physical abilities, due to it being used in various training activities by using tools, resources, and training techniques.

Since plyometric training works on developing explosive ability, it is possible to use repetitive and periodic training methods of low and high load intensity, along with the rationing of suitable training loads for players.

Results also refer to plyometric training affecting the improvement of kinetic energy and elasticity, which in turn has a significant impact on developing explosive ability through the cycle of extending and shortening of muscle fibers. and thus, plyometric trainings affect the rapid response of muscles as a reflex response, which is done by the muscle spindles (Gill, 2021).

The results of this study agree with the results of the study of Kons (Kons, 2023) that plyometric training positively affects the development of the two legs muscular ability. And the results of this study match those of (Bradford et al., 2007), (Jastrzębski et al., 2014), that the training program led to the development of physical abilities, including speed variables. The result of this study also confirms the validity of the study's results of (Türkarslan et al., 2024), that applying plyometric training program and adhere it improves the flexibility level, which exactly what football players need to increase the performance possibility that requires kinetic range and to reduce exposure to injury.

And considering the mentioned before, it appears that using the plyometric training program improved the physical abilities [under research] of football goalkeepers. Additionally, by using intense exercises that produce larger outputs and work on nervous system adaptation, plyometric training improves a player's speed and jumping ability (Abdelaal Alzohary et al., 2020).

According to the study's findings, the development of physical abilities in general, and the development of strength characterized by speed in particular, which is represented in the test of jumping up from stability; and explosive power of the leg muscles, which is represented in the vertical jump test, speed, and flexibility of action, all of them take into account the rationing of the training load, as "the training load rationing has a direct impact on the development of physical abilities, which is related to the progress, improvement, and development of the level of activities and skills in various athletics" (Booth et al., 2016). And "the physical ability level is reflected in the performance level for the exercised kinetics activity. There is a relationship between endurance and agility; there is endurance for performing kinetic skills by good coinciding with the possibility of repetition for a relatively long period so that the repetition of performance is most effective until the end of the competition." (Nitzsche et al., 2022).

These results, which are related to improving skill performance, agree with the results of (Kitamura et al., 2020), (Kons, 2023), (Nitzsche et al., 2022), and Saad (Saad, 2024) based on the fact that the training of working muscles during the performance of the skill leads to increases in both the skill's performance level and overall physical ability. Additionally, the increase of the skill performance level is influenced by the development of particular physical abilities, and these results agree with the results of the study of (Esposito et al., 2024), (Türkarslan et al., 2024), (Stojanović et al., 2017) on the fact that the development of strength characterized by speed leads to an improvement in the accuracy level of basic skill performance.

Based on the foregoing, the validity of the second hypothesis has been proven: that there is a positive effect of developing some physical abilities on the performance level of some basic skills of football goalkeepers. Thus, the second

objective of the research was achieved, which was to identify the effect of developing some physical abilities on the performance level of some basic skills of football goalkeepers.

The limitation of the study was the difficulty of gathering goalkeepers from two or more Iraqi Premier League football clubs and subjecting them to a single training program in the same stadium under the researcher's supervision because no trainer can permit his players to be loaned for the duration necessary to undergo the designated training program without the trainer being present with his players and the other team players to complete the training for the team as a whole.

## CONCLUSION

The goalkeeper is the backbone of the team because of the position he occupies, which enables him to defend his goal. Sothat, developing Goalkeeper's performance is imperative to defence the goal. Therefore, it is required that he has special physical abilities and skill in blocking balls. This study sought to know the effect of some plyometric exercises on improving the physical abilities of goalkeepers.

The research showed that the trainers rely on previous experiences during training and do not apply modern training methods. Additionally, trainers have a limited ability to provide feedback during training.

The strength and the impact of the research was introducing plyometric training to goalkeeper training curricula and making it of primary importance in developing the physical abilities and skills of goalkeepers due to the effectiveness of these trainings and the importance of their application. Also, the research enables goalkeepers to develop their capabilities and make them more capable of blocking balls executed from the penalty mark by acquiring the required speed and strength that makes them fly towards the ball with the required speed and strength to block or catch the ball.

## RECOMMENDATIONS

The researcher recommends working on developing the physical abilities of football goalkeepers by using plyometric training to improve their skill and performance levels. Also, there is a necessity to pay attention to the muscular development of the lower extremity muscles of football goalkeepers.

The scientific basis must be followed in planning the preparation period and rationing training loads in training programs to raise the component level of the training condition in general and the physical and skill condition components in particular.

The study procedures under research must be followed when designing training programs during the preparation period and conducting similar research aimed at designing standardized training programs using plyometric training, with different organizational forms on the football field.

Developing trainers by participating in international training courses in developed football countries with the goal of using modern training methods and implementing them into training programs.

## ACKNOWLEDGMENTS

To the goalkeepers of "Al-Talaba Club, one of the premier teams in the Iraqi Premier League" for their commitment to the training time and their keenness to undergo the proposed training program to obtain the best possible results.

## DATA AVAILABILITY

The data presented and/or analyzed in this study are available from the corresponding author on reasonable request.

## ETHICAL APPROVAL

Ethical approval was not required because the study is unrelated to humans or animals.

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## APPENDIX

**Appendix 1.** The pre- and post-skill performance test table (blocking and catching balls)

| Pre-test attempts | | | | | | |
|---|---|---|---|---|---|---|
| **Player** | **Degree of attempt 1** | **Degree of attempt 2** | **Degree of attempt 3** | **Degree of attempt 4** | **Degree of attempt 5** | **Total degrees** |
| Goalkeeper 1 | 0.5 | 0 | 0 | 0.5 | 1 | 2 |
| Goalkeeper 2 | 0 | 0.5 | 0.5 | 0.5 | 0 | 1.5 |
| Goalkeeper 3 | 0.5 | 0.5 | 1 | 0 | 0.5 | 1.5 |
| Goalkeeper4 | 0 | 0.5 | 0 | 0.5 | 0 | 1 |
| **Post-test attempts** | | | | | | |
| **Player** | **Degree of attempt 1** | **Degree of attempt 2** | **Degree of attempt 3** | **Degree of attempt 4** | **Degree of attempt 5** | **Total degrees** |
| Goalkeeper 1 | 0.5 | 1 | 1 | 0.5 | 0.5 | 3.5 |
| Goalkeeper 2 | 1 | 1 | 0.5 | 0 | 0.5 | 3 |
| Goalkeeper 3 | 0.5 | 1 | 0 | 1 | 1 | 3.5 |
| Goalkeeper 4 | 0.5 | 0.5 | 1 | 1 | 0 | 3 |

**Appendix 2.** The pre-and post-flight distance test table

| Pre-test attempts | | | | | | |
|---|---|---|---|---|---|---|
| **Player** | **Distance of attempt 1 (cm)** | **Distance of attempt 2 (cm)** | **Distance of attempt 3 (cm)** | **Distance of attempt 4 (cm)** | **Distance of attempt 5 (cm)** | **Total distances (m)** |
| Goalkeeper 1 | 119 | 116 | 114 | 120 | 122 | 5.91 |
| Goalkeeper 2 | 108 | 120 | 120 | 119 | 106 | 5.73 |
| Goalkeeper 3 | 119 | 120 | 120 | 104 | 119 | 5.80 |
| Goalkeeper4 | 98 | 107 | 107 | 120 | 110 | 5.54 |
| **Post-test attempts** | | | | | | |
| **Player** | **Distance of attempt 1 (cm)** | **Distance of attempt 2 (cm)** | **Distance of attempt 3 (cm)** | **Distance of attempt 4 (cm)** | **Distance of attempt 5 (cm)** | **Total distances (m)** |
| Goalkeeper 1 | 122 | 125 | 126 | 121 | 120 | 6.14 |
| Goalkeeper 2 | 124 | 123 | 118 | 109 | 119 | 6.03 |
| Goalkeeper 3 | 117 | 122 | 115 | 125 | 123 | 6.02 |
| Goalkeeper 4 | 117 | 118 | 123 | 122 | 107 | 5.87 |

**Appendix 3.** Paradigm of training program for the first week

| Week | Unit | Purpose | Exercises | Intensity | Repetitions | Groups | Intermediate rest | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Between repetitions | Between groups |
| Week 1 (3 units) | Unit 1 | Warm up | - Light jogging.<br>- Static stretching exercises (arms - trunk - legs - running with high knees - running with short, fast steps. | 30-50% | 20-30 second | 2 | Positive rest | None |
| | | Flexibility | - Standing open.<br>- Throwing the ball forward high, then doing a forward roll, then jumping to catch the ball with both hands. | 50% | 5 | 3 | Positive rest | " 3 minutes" jogging |
| | | Speed | 50-80 meter. | 80% | 2 | 2 (50,80 meter) | " 2 minutes"<br>100-meter jogging | " 5 minutes"<br>200-meter jogging |
| | | Explosive power for arms | Plyometric arm exercises with rubber resistance using a medicine ball by throwing the ball forward in repetitions. | 40% | 4 | 15 minutes | 5 (2×4) | 1 minute |
| | | Explosive power for arms and legs | - (Standing with knees bent at an angle of approximately 110 degrees) then jump forward to take the longest possible distance<br>- (Standing with knees half open) Jump with one foot to the furthest distance<br>- (Leaning in front of you on a box 30 cm high) Push the box with your palms to clap--(Leaning in front of you and your feet on a box 30 cm high) Push the ground with your hands and try to clap. | 60% | 20-30 second | 4 | 30 seconds | 60 second |
| | | The strength characterized by speed for legs | - Throw the ball high, jump over a 40cm high box, catch the ball with your hands, and run 20m on the training ladder, raising your knees high while running, and continue with the same exercise. | 70% | 3 | 3 (60 meter) | Positive rest | " 3 minutes"<br>200-meter jogging |
| | | Speed | 50-100 meter. | 80% | 2 | 2 (50,100 meter) | 200 m jogging<br>" 2-2.5 minutes" | " 5 minutes"<br>200-meter jogging |
| | | Explosive power for legs | Plyometric exercises for the legs with rubber resistance and jumping with both feet, or with one foot in the direction of movement. | 40% | 15 minutes | 5 (2×4) | Positive rest | 1 minute |