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The effect of exercises with variable weights on the development of strength and ball control accuracy in futsal players

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ABSTRACT

Objectives: To design exercises with variable weights aimed at developing the special strength required to enhance the skill of accurate ball control in football, and to examine the effects of these exercises on improving the accuracy of ball control by developing special strength.

Methods: The study used the experimental method with a group determined by using the intentional sampling method. A total of 15 players were selected from the Al-Jaish Sports Club participating in the Premier League in futsal and for the season 2022-2023.

Findings: The study found the emergence of statistically significant differences in all special strength tests and technical performance in the experimental group in the pre- and post –test, and in favour of the post-test ($p<0.05$)

Conclusions: The prepared training curriculum proved to be highly effective in enhancing the performance of the experimental group, confirming its value in improving the targeted physical attributes.

KEYWORDS: Variable Weights; Special Strength Exercises; Futsal

1. INTRODUCTION

Modern training for various group games is an organized educational process based on scientific foundations, aiming to allow players to reach the highest levels, leading to integrated, advanced, and rapid performance that the countries of the world seek. Athletes search for advanced ways with the best modern means and methods that positively affect the development of their

physical abilities and enhance their achievements in sports, especially in the types of strength that play a role in technical performance.

Nominally, in futsal, which depends on special requirements for good technical performance, muscular strength is the most important physical characteristic. However, physiological ability and the movement component can also be highlighted among other physical attributes that are fundamental, not only on the pitch but also in daily life. Thus, coaches view them as key to success in all sports events, as the level of these abilities determines the capabilities of their players. For this reason, players develop a different relationship with their muscular strength, depending on the extent to which they need to develop each element of it. Accordingly, teams—especially coaches, officials, and administrators—prioritize making great efforts to strive for achievement and victories in matches and tournaments.

Performance-specific strength is one of the basic physical elements that futsal players must possess, as muscular strength is a decisive factor in many playing situations due to the muscle's ability to overcome or confront external resistance. Therefore, ensuring the success of performing those skills requires special strength to overcome such resistance, especially the skill to control the ball. Accordingly, the coaches' focus is on training this capacity and developing the physical level of the players using the best training methods, which play a role in developing ball control ability, muscle strength, and special strength. Among these methods, training with variable weights is an effective way to achieve the desired outcomes.

Given the importance of player strength, the scarcity of research in this field, the lack of training curricula that focus on the development of the relevant aspects according to the coaches, and the fact that many coaches are not involved in modern scientific methods in the training process, the researcher decided to address this topic because of its extreme importance in improving the performance of futsal athletes by helping them develop their physical capabilities, especially their special strength. Hence, the importance of this research lies in identifying the effect that exercises with variable weights could have on the development of special strength to accurately control the futsal ball, and the advances this could represent for the game.

Through his personal experience during his sports career and his training in futsal, along with his involvement in futsal arbitration and teaching, the researcher noticed during the Iraqi Premier League matches that the strength showcased by the players could be improved. Despite their mastery of the technical and tactical aspects, implementing control improvement exercises led to missed

opportunities for achieving good results. Moreover, the fact that many coaches do not use scientific methods to develop players' physical abilities is evident and was clearly reflected in the performance of Iraqi teams participating in both local and international tournaments.

This study aims to prepare exercises with variable weights to develop the special strength to perform the ball control skill and its accuracy in futsal, and to identify the effect of exercises with variable weights on the development of special strength to accurately perform ball control.

2. METHODS

2.1. Study design and participants

This study employed an experimental design (pre- and post-test for one group). The researcher deliberately selected the research sample from the player roster of Al-Jaish Futsal Club in the Iraqi Premier League for the 2022-2023 season, totaling 18 players. Three players were excluded due to their participation in the reconnaissance experiment, leaving a final sample size of 15 players.

2.2. Instruments and procedures

Tools and devices

The following tools and devices were used: 15 futsal balls, 1 medical scale (Pearson Italian made), 3 electronic stopwatches type (Japanese-made Casio), 1 electronic manual calculator type (Japanese-made Casio), 25 plastic signs, 10 medicine balls, rubber ropes, weights of different weights, stairs of different heights, and a football field.

Exploratory experience

The exploratory experiment was conducted on Thursday, September 2, 2022, with a sample of three community members. The purpose of the experiment was to assess the level of difficulty of the tests and their suitability for the members of the research community, as well as to evaluate the efficiency of the devices and tools used in conducting the tests.

Tests

The following physical and skill performance tests were chosen:

- A test on the maximum strength of the legs [1].
- A test on how the strength of both legs had an effect on their speed [2].
- A test on the accuracy of the player's ball control aimed at a small goal in futsal [3].

Scientific basis for the tests

- Validity: The tests that achieved an agreement rate of 80% or above, according to expert opinions, were retained.
- Stability: To ensure the stability of the test, it was administered to an exploratory sample group outside the research group, with a 5-day time gap, and supervised by the researcher. The internal consistency coefficient for the test was then calculated using the Cronbach's alpha equation. The stability coefficient value was 0.86, which is a good and acceptable indicator of the test's internal consistency stability.

Pre-tests

The pre-examinations were conducted on 9/9/2022 at the entrance hall of the Army Sports Club by conducting physical testsfor the ball control skill based on accuracy. These included appropriate rest periods between one test and another to ensure the active participation of the tested participants.

The main experience

In order to fulfil the objectives of this research, a training program for the exercises was prepared for the research sample group after identifying the most important requirements that must be set to highlight the results determined by the exploratory experiment. Other factors taken into consideration were the results from the physical and technical tests, which contributed to defining the vocabulary of the training curriculum; the opinions of some experts in sports sciences specialized in training and football; and some scientific sources and references as well as personal experience in football of the researcher.

The study employed the method of repetitive training, as it contributes significantly to strength development by regulating the intensity of the stimulus, its duration, and the frequency of its repetition. Additionally, there is considerable variation in the length of rest periods, which depends on the intensity of the stimulus and the continuation of the training. The length of rest times is adjusted according to the level of intensity to optimize the effectiveness of the training. [4]

The training curriculum took a period of eight weeks, with three training units per week. Each training unit lasted from (90) to (120) minutes long, afterwards a session of (40) to (50) minutes was dedicated to train and monitor the special strength and the technical aspect of the selected skill to be

studied in that session. The implementation of the training curriculum began on Saturday, 10/9/2022, until Sunday, 6/11/2022, adding up to a total of 24 training units.

Post-tests

Post-tests were conducted on the research sample group for physical tests and ball control skills on Tuesday 8/11/2022. All tests were conducted in the hall of the Army Sports Club in Baghdad after completing the implementation period proposed in the training curriculum. The researcher was keen to adhere to and participate as part of the assistant work team in the established times and places. Additionally, he was responsible for preparing the devices and tools that were used in the pre-tests to be implemented in the post-tests.

2.3. Statistical analyses

The Statistical Package for the Social Sciences (SPSS) was used to calculate the arithmetic mean, median, simple correlation coefficient, skewness coefficient, and T value for symmetric samples.

3. RESULTS AND DISCUSSION

After applying the proposed approach, conducting the tests, and obtaining the results, the data were processed statistically, leading to the following outcomes (Table 1).

Table 1. Comparison between the pre- and post-tests of the study variables (n=15)

Variables	Unit	Pre-test		Post-test		t	p
		Mean	SD	Mean	SD		
Maximum strength of the legs	kg	66.155	6.52	71.15	2.82	7.30	<0.05
Strength characteristic of the speed of the muscles of the legs	m	1.65	0.64	2.43	0.13	8.60	<0.05
Ball control accuracy	Attempt	4	1.55	8	1.73	6.79	<0.05

The presentation and analysis of the pre- and post-test results from the experimental group clearly show significant differences in the maximum strength test between the two groups, with the post-test results showing improvement ($p<0.05$). This indicates progress, which can only be attributed to the proposed curriculum. The researcher attributes these differences to the design of the training curriculum, the nature of the exercises included, and the variation in the methods of performance.

The results show significant improvements in the speed-strength test for the muscles of both legs after completing the training ($p<0.05$). Moreover, it is clear that there are significant differences in the accuracy of the ball control test. The researcher attributes these differences to the nature of the curriculum and the development of the players' special strength, which includes maximum strength, speed-strength, and the technical performance associated with strength. Hence, the importance of special strength and its components in improving the player's technical and tactical level is evident, as confirmed by Nassif [5].

4. CONCLUSIONS

The results of the study indicate improvements in all tests of special strength and ball control skills for the experimental group between the pre- and post-tests, with the post-test results showing considerable gains. Specifically, there was notable development in the accuracy of the ball control skill among the research sample members. Furthermore, the post-test results demonstrated the positive impact of the intervention on both special strength and technical performance, as evidenced by the skill tests conducted. The prepared training curriculum proved to be highly effective in enhancing the performance of the experimental group, confirming its value in improving the targeted physical attributes.

5. RECOMMENDATIONS

Based on these findings, the author suggests several recommendations. First, the adoption of training with variable weights is crucial for developing special strength and technical performance, as it offers superior benefits over traditional training methods, particularly in enhancing motor skills. Additionally, the use of modern equipment to develop various forms of muscular strength should be prioritized. The author also recommends conducting similar research on other physical elements and diverse group samples to further explore these findings. Finally, there should be an emphasis on incorporating modern training methods, particularly advanced technologies such as visual aids (e.g., television, videos, and computers), to optimize the training process.

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AUTHOR CONTRIBUTIONS

All authors have made substantial, direct and intellectual contribution to the work, and approved it for publication.

CONFLICTSOF INTEREST

The authors declare no conflict of interest.

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