

The Effect of Structured Exercises with Water Weights (Tidal Tank) On Some Skill and Physiological Abilities of Under-19 Football Goalkeepers

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ABSTRACT

The purpose of the research was to prepare exercises rated with water weights (Tidal Tank) in some abilities in some skills and physiological abilities of goalkeepers in football under 19 years, and identifying the effect of exercises rated with tidal tanks on some of the skill and physiological abilities of the members of the research sample, and the researchers used the experimental method of comparing each group by the method of pre-test and post-test to suit the nature of the problem that the researcher wants to address, and the researchers selected the research sample by the deliberate method, which are the goalkeepers of the (U19) category in football, which are (4) goalkeepers, and the researchers conducted the pre-tests of skill and physiological abilities on the members of the research sample, and the research experiment was applied It consisted of a group of (Tidal Tank) exercises on goalkeepers in football, where the duration of its application lasted (8) weeks with (3) training units per week, and the total number of units reached (24) training units, after which post-tests were conducted on them, and the statistical bag (SPSS) was used to obtain the results of the research, and the results reached by the researchers were positive significant differences in favor of the post-tests and for all research capabilities, and the researchers concluded that the application of a set of metered exercises The Tidal Tank on soccer goalkeepers has had a direct impact on the development and improvement of some of the special skill and physiological abilities of soccer goalkeepers.

KEYWORDS: Goalkeepers in football, Physiological abilities, Skill abilities, Tidal Tank, Unstable Load Training.

INTRODUCTION:

The rationing of the training load from a physiological point of view aims to improve athletic performance through the physiological adaptations of the body, as the components of the training load are adjusted in a way that is proportional to the player's biological abilities and his playing center in football, which ensures the development of the player's vital organs without reaching a state of fatigue or excessive stress and also helps to achieve the ideal balance between physical and functional effort, which leads to improving the player's skill and functional performance in the match effectively, and that the use of devices and tools Assistive training is essential and one of the basics of sports training, and one of these auxiliary training tools and means is the water weights (Tidal Tank), as it is not limited to a specific category, it is suitable for young and old, beginners and advanced alike, which can be used by the coach for the purpose of developing aspects and the skill and physiology of the playing centers, and one of these centers is the goalkeeping center in football, which must possess

these special requirements and capabilities of this center and apply them in real time and quickly, during which it can reach the highest level of performance (Faiq M. Al-Zwainy, 2024).

The goalkeeper represents the first offensive line of the team because it represents the basic rule in building the game from the back, as sometimes the attack starts through him, as well as represents the last defensive line of the team, so he is not likely to make any mistakes, so he must have a high efficiency in all the skill and physiological abilities of this position, so the coaches and goalkeepers must pay attention. In their training curricula, they include in their training curricula special complex and various specialized exercises that are commensurate with the specificity of this center in order to prepare and develop a goalkeeper characterized by special abilities that enable him to perform his skills effectively, as well as the use of these compound exercises using auxiliary training devices and tools such as water weights (Tidal Tank) and rationing them using the Polar system (Polar Verity Sense) and the gradation in the difficulty of its training loads to the high and maximum loads that help him improve the goalkeeper's performance and cause physiological adaptation to the conditions of the match, and this depends on the type of exercises that take the form of performance, and the nature of the motor duty of the goalkeepers in order to reach and improve the level of the goalkeeper's performance in football.

Several studies have dealt with the goalkeeping center in football, including a study (Khalil, 2009) The aim was to prepare and identify the two different proposed training methods for both muscular ability and flexibility training in developing the speed of motor response for young goalkeepers in football, As for the study (Al-Dinawi, 2012) The aim was to prepare and know the effect of special exercises according to the division of the penalty area to develop the physical abilities and basic skills of goalkeepers in football, and study (Al Einziu, 2018) The aim was to prepare and identify the effect of compound exercises with various resistances to motor speed, explosive ability of the limbs, and the skills of musking, and punching (hitting) high balls for young football goalkeepers, and study (Abd Al Sahib, 2019) which aimed to prepare and know the effect of back and side jump exercises on the development of the explosive power of the back and lateral muscles, and study (Mutashar, 2019) which aimed to prepare and identify the effect of the exercises, especially to develop some physical abilities and basic defensive skills for goalkeepers in football, and study (Saleh, 2021) The aim was to prepare and identify the effect of the exercises, especially aids to develop the speed of motor response and some basic skills for goalkeepers in youth football, and study (Farhan, 2022) The aim was to identify the relationship between sensory abilities and some basic skills of goalkeepers in football.

Due to the experience of researchers in the field of the game, as they work in the field of football, and through their follow-up and observation of many matches of the Iraqi Stars Professional League clubs as well as the national teams and the training of their goalkeeper coaches, you noticed a decrease by observing and following up on the level of some skill abilities, which is reflected in the level of the physiological aspect of the goalkeepers of the Iraqi Stars Professional League clubs in football. Lack of sufficient focus on the use of standardized compound exercises, as well as the lack of provision or use of modern auxiliary and training devices and tools such as the (Tidal Tank) and the (Polar Verity Sense) system to regulate training loads, and accordingly, the researchers decided to address this problem by conducting a field study that includes the preparation, design, and application of metered exercises combined with water weights (Tidal Tank) is commensurate with the capabilities and capabilities of the goalkeeping center and takes into account the specificity of this center, and to study its impact on some abilities, skills and physiology of goalkeepers under 19 years old in football.

the objectives of the research were to prepare exercises rated with water weights (Tidal Tank) in some abilities in some skills and physiological abilities of goalkeepers in football under 19 years old, and to identify the effect of Exercises regulated by water weights (Tidal Tank) in some of the skill and physiological abilities of goalkeepers in football under 19 years old.

METHODS:

Research Design: The researchers used the experimental method, specifically a single-group pre-test/post-test design, as it was the most suitable approach for the nature of the research problem that the researcher wants to address.

Research community and Sample: The researchers deliberately selected the research sample, which are the goalkeepers of the Iraqi youth team (U19) category in football, which are (4) goalkeepers selected by the goalkeeper coach of the Iraqi youth team (U19) in football, and who represent (100%) of the indigenous population for the research, and the sample was obtained through the Iraqi Central Football Federation, where they were called from the clubs participating in the Iraqi league for the youth football category under (u19) years for the football season. 2025-2026) After the coach of the Iraqi youth team (U19) invited them through the federation to engage in the training of the Iraqi national team for the youth category (U19) in preparation for the Asian Nations Qualifiers for the youth category (U19) in football for the year (2027), and the researchers conducted a homogeneity process between the members of the research sample as shown in Table (1).

Table 1: It shows the means, standard deviations, median, and Skewness in length, weight, and age of the research sample.

#	Variables	Unit of Measurement	Mean M	Standard deviation S. D	median	Skewness SK
1	Length	cm	182.75	2.754	182.50	0.232
2	Weight	kg	77.25	1.500	77	0.370
3	Training Age	Year	4.75	1.708	4.50	0.753
4	Biological age	Year	17.5	0.577	17.5	0.000

It was found that the values of the torsion coefficient were distributed between (-1) and (+1), meaning that there is a homogeneity in the variables of age, weight, height, and training age within the normal curve and that the sample members are homogeneous in these variables.

Training Tools: The researchers used the following training tools;

(Tidal Tank, 2026)"It is a modern water bag that is used in the sports training process to develop the elements of balance and functional strength, and it is called (tidal tanks), where the full weight of the water flowing from one side to the other is affected in response to the smallest inclination made by the player during training, and each repetition is different from the other, as it demands something different from your muscles and motor control each time, For example in order to lift it above your head even the smallest muscles are activated to work with the larger muscles to maintain balance and strength and when comparing the (tidal tank) to the sandbags we find that the weight of the (tidal tank) is made up of (100%) water, it is constantly moving so the player has to adapt as well, while maintaining and controlling his body weight", Number(6) different shapes, weights and sizes.

(Polar Verity Sense, 2026) "is an optical heart rate monitoring device that gives you maximum freedom of movement and multiple options to view and record your workouts. Thanks to Bluetooth, ANT and internal memory, you can connect Polar Verity Sense to a sports watch or app to watch your workouts live, or view your data later", (4) to measure the heart rate.

(Monark Device), (I pad), (Lap Top), (Smart Electronic Scale).

Tests Research Variables:

1- Test the skill of catching high balls; (Al-Dinawi & Al-Fartousi, 2020, pp. 230-233)

Objective of the test: Measure the goalkeeper's skill ability to catch high balls over the head

Test Tools: Regular Half Field for Football, Keeper Work in the Box, (10) Balls, Legal Goal, Indicators to Determine the Division of the Penalty Area, Measuring Tape, Registration Form, Whistle.

Test Specifications: The goalkeeper stands in the designated place in the goal and according to the position of the ball from the goal, and upon hearing the instruction from the coach, the goalkeeper must exit the goal to the divided areas to catch the high ball that is executed from the front of the box, and the two sides of the field, as shown in Figure (1)

Test Conditions:

- The Laboratory (Goalkeeper) shall be given (10) balls, (4) balls from the front, and three (3) balls for each side from outside the box.
- The tested goalkeeper will exit within the designated test area according to the division of the box.
- The other goalkeeper enters as a competing player in these areas to increase the competition between the two testers and the speed of the goalkeeper to catch the ball from the highest point and according to international football law.
- If the ball does not reach the places specified by the coach, try again.

Scoring Scores: Grades are recorded from the front; the safe side and the left side as follows:

- (3) scores are given when the ball is completely held directly from the top and above the opposing player.
- Two (2) degrees are given when holding the ball in two batches.
- A score of (1) is given when the ball is removed from the opposing player.
- A (zero) is given in the event that the ball does not reach the ball or it enters the goal by the opposing players.

☒ The sum of the ten attempts is calculated.

$$\text{Final Grade} = \frac{\text{Total Attempts Scores (10)}}{10}$$

Test Illustration:

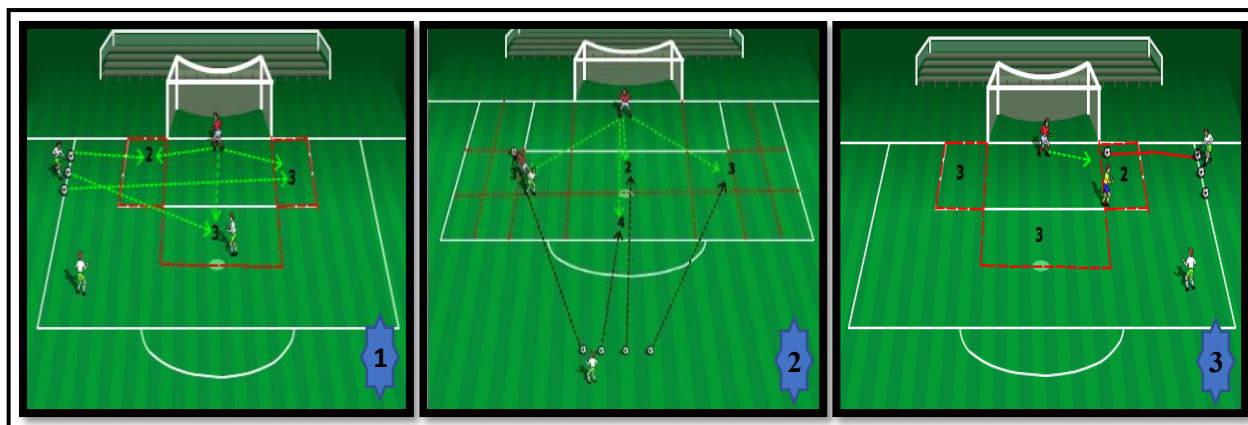


Figure 1: Test shows high ball-catching skill.

2- Testing the accuracy of the delivery of the rolling earth ball (by hand) out of the box in the first third of the stadium according to the specified places. (Build play for the side). (Al-Dinaw & Shabib, 2024, p. 96)

Objective of the test: To measure the accuracy of the delivery of the ball rolling on the ground by hand to the goalkeeper from inside the box, and according to the specific places in the case of building play from behind in (the first third of the field).

Test Tools: Half regular football field, small goal (2) height 1 meter and width of 1.5 meters, balls (4), whistle, registration form, white rubber stick rope to mark the area in which it moves.

Test Specifications: The goalkeeper stands in the goal between the 6-yard line and the goal line, and upon the instruction, he receives a ball rolling on the ground from the coach who is standing outside the box, the goalkeeper holds the ball and moves in the designated area and plays the ball with his hand (rolling on the ground) in the small goal outside the box on the side of the field (right and left). It is also shown in the drawing in Figure (2).

Test Conditions:

- The goalkeeper receives the ball in the designated place exclusively inside the (6) yard line.
- He plays the ball with the hand he uses and according to the rules of the game.
- It has freedom of movement in the area specified by the plastic rope and according to the test condition, as shown in the drawing.

Scoring Scores:

The total score obtained from the attempts shall be recorded for the laboratory guard, as follows:

- (5) marks are given for each one correct attempt in case it enters the goal.
- Gives (0) of the score in case the ball is played outside the small goal.
- In case the ball hits the post of the goal, (3) marks are calculated.
- The number of attempts is (4), each side has (2) attempts.
- The total score is calculated for the number of attempts of the (4) balls for the laboratory.

Test Illustration:

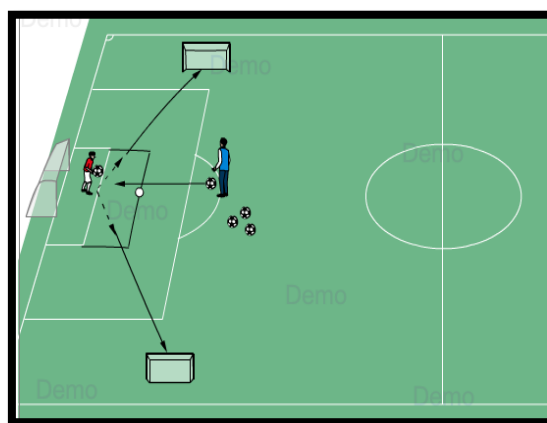


Figure 2: The test format shows receiving and playing the ball by hand in the small goal.

3-Test the receipt and delivery of the rolling globe by foot in the first third of the stadium according to the specified places. (Building play) (Al-Dinaw & Shabib, 2024, p. 85)

Objective of the test: To measure the accuracy of the goalkeeper's handling of the ball with the feet on the delivery of the rolling ball according to the specified places in the case of building play from behind in (first third).

Test tools: a third of a regular football field and the work of the goalkeeper (receiving the ball with football) in the box, (5) balls, training cones to identify the designated areas, his whistle, a registration form.

Test Specifications: The goalkeeper stands in the designated place inside the box and on the (6) yard line, and upon the instruction, the goalkeeper receives the ball with the foot from the coach or colleague who stands in the middle above the arc of the box of the field, then the goalkeeper plays the ball to the side in one of the designated areas at an angle of (30-60), then receives another ball (the second) and plays it on the opposite side, then receives a (third) ball and plays it in the specified place at another angle (90) then the ball The fourth is at the opposite angle, then the fifth and sixth balls are played forward according to the designated places. It is also shown in the drawing in Figure (3).

Test Conditions:

- If the coach or teammate misses kicking the ball and fails to deliver it to the goalkeeper standing in the designated spot, the attempt is repeated.
- The ball is played in the designated place only.
- The goalkeeper receives the football in accordance with the rules of the game.
- The goalkeeper receives the ball in the area specified between the (6) line and the (18) yard line, and the width between the end of (6) yards.
- The guard should not deviate from the place specified for him in the box as shown in the drawing.
- The small goal distance between the plastic hoses is (2) meters.

Scoring Scores: The total score obtained from the six handlings shall be recorded for the tested guard, as follows:

- Two (2) grades are given to the ball played directly in the specified area between the plastic hoses.
- A score of (1) shall be given to the ball that hits or touches the plastic hose.
- (0) of the score is given in case the ball is played outside the specified area.
- The total scores are calculated for the number of attempts to play the (5) balls for the laboratory.

Test Illustration:

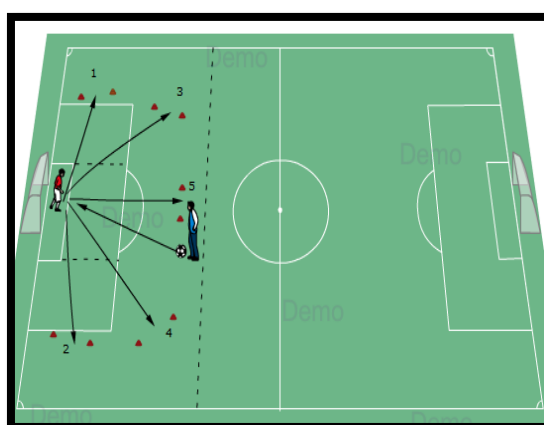


Figure 3: Shows the specific places in the case of building play from the back in (first third).

4- Pre-exertion and post-exertion heart rate tests.

Test Name: Heart Rate Measurement Test.

Purpose of the test: Measure the heart rate test before physical exertion (resting pulse) and after physical exertion (intensity pulse)

Test instruments: Monarch bike and accessories, Polar Verity Sense, and Figure (4) shows this.

Test Procedures:

- The resting pulse rate was recorded for one minute using the Polar Verity Sense device worn by the tester in his arm.
- The tester sits on a bicycle to perform a physical stress test (Wingate) to measure the heart rate after physical exertion (maximum intensity pulse) and is wearing a Polar Verity Sense device in his arm that gives a direct and accurate reading of the heart rate variable.

Recording: The researcher relied on the (Polar Verity Sense) device, which gives a direct and accurate reading of the heart rate variable.

Test Illustration:



Figure 4: Polar Verity Sense device for measuring heart rate

5- Anaerobic ability test: (Radwan & Al Saud, 2013, p. 153)

Test Name: 30-Second Wingate Test

Purpose of the test: Measure anaerobic capacity with the performance of the maximum possible occupancy for 30 seconds.

Test instruments: Monarch bike and accessories, Lap Top.

Test Procedures: After taking the length and weight of the laboratory, its data is entered into the test program in the computer, and the resistance is determined according to the weight of the laboratory, which is (75) grams per kilogram of the laboratory weight, and the seat of the bicycle is adjusted so that there is a very light bending angle at the knee joint by (10) degrees, then the foot strap is adjusted and fixed, a resistance of (1-2) kg is placed relative to the weight of the lab to perform the warm-up for (3) minutes, then the test procedures are explained with the alert on the announcement. At the moment of starting, and to make sure and before performing the test, the tester performs at the maximum possible speed for (3-5) seconds and repeats these two or three times, and turns on the rotation indicator (RPM) to track the speed of the wheel's rotation since the measurement began.

The weight (Load) is gently lifted from the weight basket and the tester begins to move the wheel at the maximum possible speed (not less than 80 rpm) for no more than (3) seconds, then the weight is lowered with the operation of measuring the distance from the keyboard to start the measurement process, and the performance continues for (30) seconds, at maximum speed and without stopping, and the laboratory encourages to maintain the rotation speed, and the cooldown must be performed after the completion of the test, and Figure (5) shows this.

Registration: Test results are recorded by a computer (Lap Top) through a special program for the Monarch bike.

Test Illustration:



Figure 5: Wingate test shows thirty seconds by Monarch bike.

Field Procedures:

exploratory experiment:

pre-tests: The researchers worked by applying the pre-determined pre-tests on (Thursday) (20/11/2025) at (10) am and on the playgrounds of (College of Physical Education and Sport Sciences - University of Baghdad).

Main Experiment: The researchers applied the vocabulary of the main experiment of these exercises prepared by them in this study, which consists of (24) exercises described in appendix(1) , where the researchers divided the members of the research sample, which are (4) goalkeepers, into two groups, and each group contains (2) goalkeepers who work alternately in one group, while the researchers used the exchange system in work between the first and second groups, and the time period when performing repetitions for the first group of goalkeepers is the same as the rest period for the second group of Goalkeepers and vice versa as well when the second group of goalkeepers is working is considered the same as the rest period for the first group of goalkeepers, and the work-to-rest system is (1:1) in relation to the performance time, so there is no rest period between repetitions, as during this period of time the heart rate was returned to (120-130) s/m, and the rest period between each group is (60-90) seconds The rest is one exercise and the other (60-120) seconds, where during this period of time the heart rate was returned to (100-120) s/m, and each exercise consisted of (3) totals and each group had (2) repetitions, and the time of one repetition reached (20-30) seconds, through which the exercise is performed by the first group consisting of two goalkeepers in a row and the performance of blocking movements from Lifting or flying and distributing balls with the arm or foot, and the exercises were carried out by the method of high-intensity interval training and the method of repetitive training, The application of the exercises continued for (8) weeks consisting of two months for two intermediate training circles, and each circle consisted of (4) small weekly training circles, and the weekly small training circle contained (3) training units divided into days (Sunday, Tuesday, and Thursday) of each week, and the total number of training units was (24) units described in appendix(2), where the number of exercises in one training unit reached (8) exercises taken at the time from the main part of the special training unit for the sample members, and the total time for the application of these exercises was in the preparation stage The researchers took into account in the design and implementation of the exercises the principles of ripple and gradation in the intensity of the daily and weekly training units, where the training load was in the weekly small circles (1,2) and

in the first monthly intermediate circle (1,3) and the second (3,1), and the training stress levels of the exercises were determined by the target pulse rate of the exercise, where the pulse rate was determined. The training intensity for the first week (76%), the second week (77%), the third week (82%), and the fourth week (87%), while the training intensity for the fifth week (91%), the sixth week (92%), the seventh week (89%) and the eighth week (82%), while the training intensity for the first monthly cycle was (80.5%), while the training intensity for the second monthly cycle was (88.5%), as for the training intensity. The total number of the curriculum reached (84.5%), and Figure (6) shows this. and the relative weights in the exercises metered with water weights (Tidal Tank) were determined according to the scientific foundations of the relative weight loading rule by relying on the divisions of the world (Fisher) taking into account the individual differences between the weights of the goalkeepers.

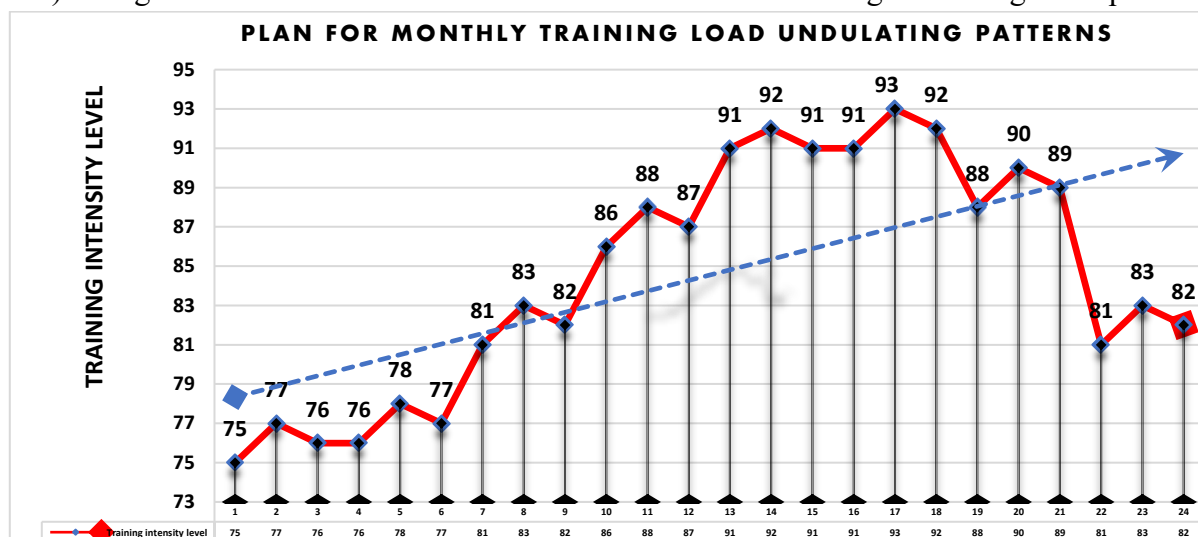


Figure (6): Showing the lifting and lowering of the load during the application of the Tidal Tank exercises

post-tests: as for the post-tests the researchers worked after the completion of the implementation of the main experiment in the application of the exercises prepared and designed by the researcher with the Applying the post-tests according to the approved mechanism for the pre-tests that were determined in advance, where the post-tests were conducted on (Saturday) (24/1/2025) at (3) pm and on the stadiums of (College of Physical Education and Sport Sciences - University of Baghdad).

Statistical Methods: the researchers used the statistical package (SPSS) to extract the values. The research variables are arithmetic mean, standard deviation, median, Skewness, the paired samples t-test to compare pre- and post-measurements and Impact size, The level of statistical significance was set at ($p \leq 0.05$), as values below this threshold were considered statistically significant.

RESULTS:**Presentation, analysis of the results:**

Table 2: Shows the values of the Arithmetic mean and standard deviations of the pre- and post-test of the studied abilities

#	Variables	Unit of Measurement	Pre-test		Post-test	
			mean M	Standard deviation S D	mean M	Standard deviation S D
1	Holding high balls over the head	Degree	1.300	0.258	2.500	0.383
2	Accuracy of delivering balls with hand in the first third of the pitch	Degree	9.75	0.957	18.50	1.915
3	Accuracy of delivering balls with feet in the first third of the pitch	Degree	3.50	1.291	8.75	1.500
4	Heart rate before exertion	S/m	85.50	0.645	73.75	0.479
5	Heart rate after exertion	S/m	199.50	3.000	171.25	2.217
6	Hypoxogenic capacity	W/kg	7.205	2.457	8.365	2.309

Table 3: Shows the values of the Arithmetic mean of difference, standard error, calculated value (T), Level significance and Type significance for the research variables under study for the pre-test and post-test (N=4), where N, goalkeepers in football u 19 years old.

#	Variables	Unit of Measurement	Arithmetic mean of difference M D	Standard Error S E	Calculated value. T	Level Significance Sig	Significance Type Sig	Impct size
1	Holding high balls over the head	Degree	1.200	0.270	4.431	0.021	Sig	2.21
2	Accuracy of delivering balls with hand in the first third of the pitch	Degree	8.750	0.629	13.908	0.001	Sig	6.95
3	Accuracy of delivering balls with feet in the first third of the pitch	Degree	5.250	0.250	21.000	0.000	Sig	10.5
4	Heart rate before exertion	S/m	11.750	0.750	15.667	0.001	Sig	7.8
5	Heart rate after exertion	S/m	28.250	2.175	12.991	0.001	Sig	6.4
6	Hypoxogenic capacity	W/kg	1.160	0.223	5.195	0.014	Sig	2.5

Note: Differences were considered statistically significant at ($p \leq 0.05$) and with a degree of freedom (3).

DISCUSSION:

By reviewing Table (3), we note in the results of the pre- and post-tests of the special skill and physiological abilities of goalkeepers in football that there are significant differences with statistical significance in favor of the results of the post-tests and for all abilities under study and research, as shown in Figure (6) for the studied skill abilities and Figure (7) for the studied physiological abilities.

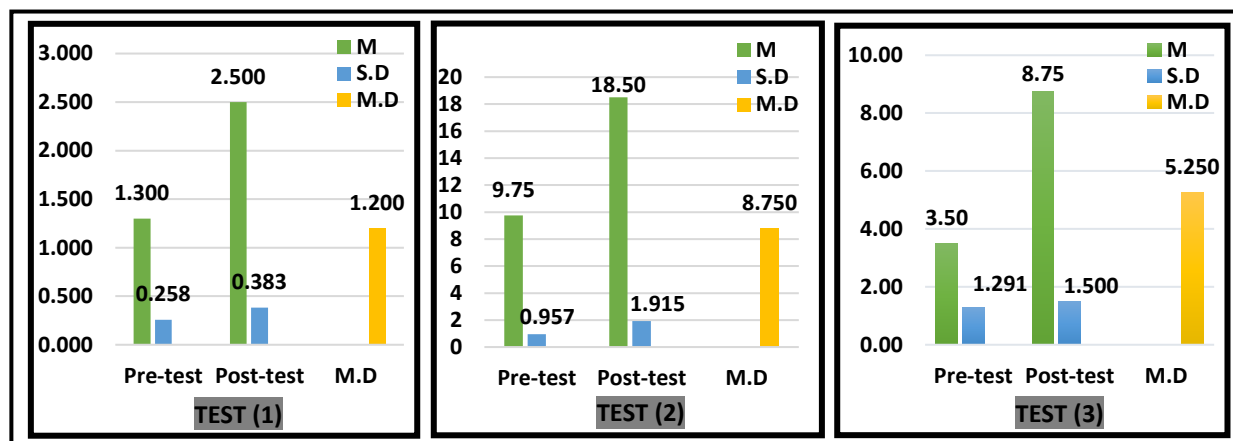


Figure 6: It shows the graphical columns of the results of the pre- and post-tests of the studied skill abilities.

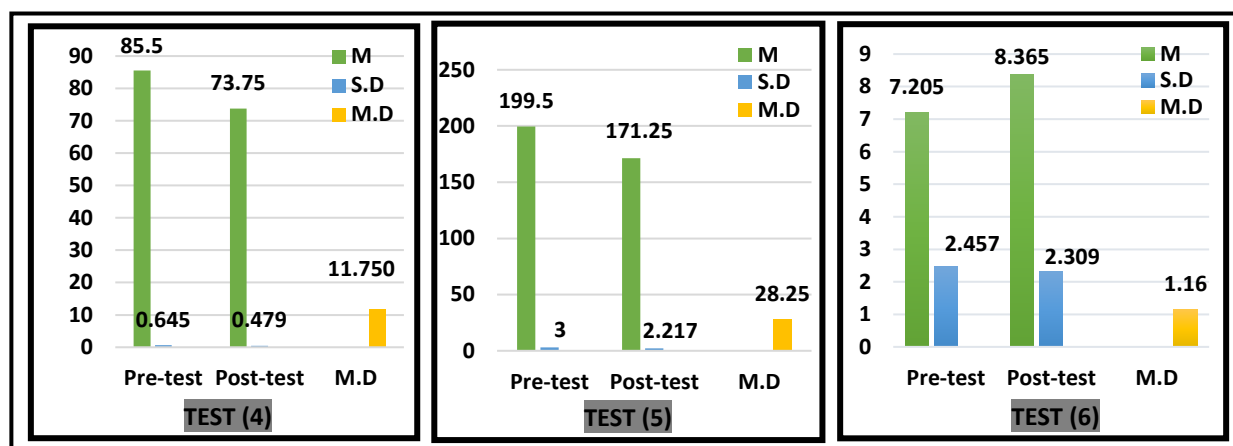


Figure 7: It shows the graphical columns of the results of the pre- and post-tests of the studied skill abilities.

and the researchers attribute the reason for this development to the effectiveness of the effect of the (Tidal Tank) on the goalkeepers in football, where the researchers relied on the application of the exercises on the principle of (Unstable load training) using all the various and multiple water weights (Tidal Tank) provided by the researchers, and was worn by the goalkeeper in some specific areas of his body, and working on good and codified coordination of the components of the training load in terms of (intensity, size, and comfort) based on the method of high-intensity and repetitive interval training and using the (Polar Verity Sense) system to ration training loads, Which is commensurate with the capabilities, characteristics and abilities of the members of the research sample, which contributed to the development of skill abilities, which was reflected in the development of the physiological abilities of goalkeepers in football, where the exercises were gradual in difficulty and repetition throughout the duration of their implementation, which took (8) weeks and at a rate of (3) units per week, which helped to develop the skill and physiological abilities through the content of the weight-regulated exercises, which were developed according to the scientific foundations of training that aim to reach the goalkeeping center The highest level of physical fitness of the goalkeeping center for football and thus the goalkeeper reaches the best and highest level of skill and functional performance, This is what all of the (Al-Bashtawi & Al-Khawaja, 2005, p. 140) Quoting (Schnabel) "that the adaptation process resulting from the use of physical loads takes the form of sequential waves and at certain times, and that the changes that occur in the morphological and functional aspects do not occur until after the passage of (6-8) weeks, and in the event of leaving or absetting the training load, these results gradually disappear", and also confirms that (Abdel Fattah,

1996, p. 32) Quoting (Wilmore, Castel) "Most of the changes resulting from the training processes occur during the first period of the program and within (6-8) weeks".

and when looking at the time period of time it took to implement the exercises prepared by the researchers, we find it appropriate and close to this period of time, which was determined by the sources according to the scientific experiments, which contributed to making these developments in the results of the post-tests of all skill and physiological variables under study and research, as well as the application of the principle of ripple and gradation in training loads and their rationing. In a scientifically studied manner that is suitable for the members of the research sample, it contributed to making adaptations and developments in the skills and functional abilities of the researched. And this is what he confirmed (Juard , 1999, p. 22) "The gradual progression of the training units of the curriculum creates a state of continuous increase in physiological, physical and skill adaptations and thus the improvement of the level of performance", as the use of Unstable Load Training using tools such as the (Tidal Tank) contributed to the occurrence of a set of physiological adaptations in the goalkeeper's body, including important physiological changes or adaptations in the heart, including acute cardiac responses such as an increase in heart rate more than traditional training, an increase in cardiac load due to the unpredictability of pregnancy, an increase in cardiac output due to an increase in stroke volume, a higher pumping rate to meet muscular demand, and an increase in oxygen consumption (VO_2) due to increased mobility recruitment and increased simultaneous muscular activity, And that's what he came up with (Saeterbakken & et al, 2019) From the results of their study "Training with unstable loads raises heart rate and oxygen consumption", Recalling (Bompa and Haff, 2009) "Continued training and physical exertion affects energy systems and functional adaptation to those training loads", And this is what he pointed out (Mawla, 1999, p. 25) "The heart rate gives us a picture or an indicator of the athlete's condition, and the effort exerted during the performance of the training units, and then the possibility of rationing and distributing the training loads according to scientific bases between intensity, size and comfort", This is what he confirms (Yahya , 2002, p. 67) "The use of well-designed and implemented curricula in a way that leads to the development of physical performance, is one of the reasons for excellence in the field of sports", And that's what they came up with (Colado & et al, 2019) According to the results of their study "The use of water bags in training increases the cardiac load compared to stationary weights", the continuous movement of water molecules inside the training bag or tidal tank leads to a sudden change in the direction and intensity of the load, which requires the central nervous system (CNS), Sending repeated and fast nerve signals to the working muscles in order to maintain motor control and balance, so this continuous repetition leads to an increase in the recruitment of motor units, improve neural synchronization, activate the deep muscles (core muscles), improve the speed of the transmission of nerve impulses between the central nervous system and the working muscles, in addition to developing the ability to produce force quickly, which is a key element in the phosphogenic system, which is considered to have contributed to the development of The anaerobic ability of football goalkeepers, And that's what he came up with (Behm & et a, 2018) Through his study "Sedentary training improves (Rate of Force Development – RFD) and neural recruitment, which are two essential elements in phosphogenic ability".

The exercises rated with the water weights (Tidal Tank) prepared and used by the researchers in the main experiment were gradual in difficulty and repetition throughout the duration of their implementation, which took (8) weeks and at a rate of (3) units per week, and the total training units were (24) training units, which consist of (8) exercises in one training unit, which helped in the development of abilities (skill) and reflected positively on physiological abilities (anaerobic ability), in addition to the training load-refined exercises using the (Polar Verity Sense) system, which It was

developed according to the scientific foundations of training that aims to reach the goalkeeping center to the highest level of physical fitness of the goalkeeping center for football, and thus the goalkeeper will reach the best and highest level of skill performance, And this is what he pointed out (Farhan, 2021, p. 169) "The training work must be scientifically studied and according to the individual and physiological capabilities that achieve functional adaptation to improve the physical and health level of the player and to achieve the requirements of the physiological preparation of goalkeepers in football, and the preparation should be towards training functional abilities", recalling (Al-Basati A. A., 2001, p. 49) pointed out that "when training functional abilities, the direction of training should be determined quantitatively, qualitatively and methodically according to the basic system of energy extension".

The researchers also used exercises with unstable load with water weights (Tidal Tank), where the time duration of one repetition was (20-30) seconds through which the exercise was performed, which is considered within the first system, according to what he pointed out (Al-Kubais & Al-Ali, 2011, p. 103)"The duration of the phosphagine system ranges between (25-30) seconds depending on the amount of creatine phosphate compound (CP) present in the muscle and its size", taking into account the rest times after the performance of that brown effort by the goalkeepers, where the rest time between each group and another was (60-90) seconds, and the rest was (60-120) seconds, during which the heart rate returned to (100-120) S/M, he can restore the goalkeeper's body to its normal position and compensate for the lost energy, and this is what he pointed out (Al-Mudamagha, 2017, p. 557) Quoting (Mark Farlane) "that the appropriate rest rate for creatine phosphate reconstruction is about (75) percent within (60) seconds and (87) percent during (90) seconds after exertion", where these timings of the components of the training load and relying on the method of high-intensity and repetitive interval training and using the (Polar Verity Sense) system in addition to the relative weights contributed to the development of the anaerobic system and thus contributed to the development of the anaerobic ability of the goalkeeper with the football, And this is what she pointed out (Aneta, 2008, p. 125) She said "Structured and high-intensity exercise training affects energy productivity in the body, as it leads to the rapid consumption of the (ATP) compound to its maximum limits when training short distances with high stress, provided that it is interspersed with intervals between repetitions and training groups for the purpose of recovery and rapid rebuilding of (ATP), and these exercises lead to increasing the efficiency of the mitochondria (energy stores) in rebuilding (ATP).This increase occurs as a result of training for a long time with such stress, which causes a state of adaptation as well as an increase in energy production", he said (Salama, 2000, p. 282)" "The anaerobic ability of football players represents the basis of the physiological number process, and it means the ability of the muscles to perform maximum muscle contractions within a period of time from (10) seconds to a minute or two, so that the reliance on the lactic system is in the production of energy, and the anaerobic ability also represents the ability of the muscles to work under the light of oxygen debt and tolerate performance under the conditions of muscle fatigue resulting from the accumulation of lactate in the blood (Abd Al Fattah, 2016, p. 306) Quoting (Sharkey, 1993) "The percentages of the contribution of energy systems of goalkeepers in football consist of (80%) anaerobic and (20%) antenna", as stated (Radwan A. N.-D., 2019, p. 127) "The energy system used for the goalkeeper in football consists of two anaerobic systems, namely (95%) phosphate (ATP-CP) and (5%) lactic acid".

and the researchers in the preparation and design of the exercises rated with water weights (Tidal Tank) on goalkeepers in football relied on the basic principles of sports training, taking into account the principle of gradation with training loads as well as the principle of ripples, as well as the timing of the set exercises as well as the rest times The researcher was used to monitor and follow up the

intensity of performance directly during the application and implementation of exercises through the system of the (Polar Verity Sense) device to apply and perform the exercises with the required and specified intensity according to the target heart rate, where the player's performance is not allowed to descend below the specified intensity of performing the exercises and at the specified and high heart rate, in addition to the fact that the exercises have a competitive aspect and simulate the reality of the match and in different situations and situations when applying the skills of the goalkeeping position in football, whether they are defensive skills From catching or blocking high-altitude balls if they are from the front or side of the goal, or if the skills are offensive, such as distributing balls by hand or passing balls with the foot to a colleague or to a specific location, the researchers also put the exercises in the form of compound exercises from the skill side when applying the exercises defensively and offensively in order to accustom the goalkeeper in making the transition from defensive to attacking in order to surprise the opponent in performing quick offensive transitions Similar to the conditions of the match, and all of this contributed to the development and adaptation of the functional organs of the goalkeeper's body, and this is what he pointed out (Al-Basati A. A., 2015, p. 52) "The use of the pulse rate to clarify the status of functional devices, as it gives quick scientific and practical indications that can be used as an indicator to assess the load and rest to achieve adaptation, and then the pulse rate is one of the important and easy-to-use physiological indicators in the applied field, and it can be used to determine the level of load intensity, as it gives the coach positive and quick information and the reactions of the functional devices in real time on the field, and then directs the training load"

CONCLUSIONS:

1. We conclude that the application of a set of exercises with tidal tanks on soccer goalkeepers had a direct impact on the development and improvement of some of the special skill and physiological abilities of soccer goalkeepers.
2. We conclude through how to deal with the training load (size, intensity, intensity) using the Polar Verity Sense system during its field application in all twenty-four training units that were tolerated and implemented by the research sample, which contributed to raising the level of development of some of the abilities under study in this research in the skill and physiological aspect.
3. We conclude that the mechanism of rationing and calculating the relative weights adopted for all parts of the body in the application of the exercises rated with water weights (Tidal Tank) on the parts of each of the members of the research sample clearly and positively contributed to the development and raising of the level of their skill and physiological abilities.
4. We conclude that the use of water weights (Tidal Tank) is one of the training methods that can simulate performance and create a competitive environment similar to the environment and conditions of the match, as it provides the security and safety factor on the goalkeeper's body when wearing it and does not pose any danger to him, in addition to allowing the freedom of movement of the goalkeeper and movement without restrictions.

RECOMMENDATIONS:

1. Attention by all coaches and workers in the game of football in the training curricula of their teams and to pay attention to the training of the goalkeeper position because of its clear importance, as this position is one of the main and important pillars of any football team.
2. The need to contain the training curricula of the team and the goalkeeping center in particular with vocabulary that is concerned with appropriate training methods and methods, including the method of training (high-intensity and repetitive interval).

3. The necessity of providing and using modern devices and water weights (Tidal Tank) that can simulate performance and create a competitive environment similar to the environment and conditions of the match, as it provides the factor of security and safety on the goalkeeper's body when wearing it and does not pose any danger to him, in addition to allowing the freedom of movement of the goalkeeper and movement without restrictions, and this contributes to the development of the skill and physiological abilities of the goalkeeping center in football.
4. The use of the principle of Unstable Load Training using Tidal Tanks contributes to the improvement and development of the capabilities of the goalkeeping position in football.

AUTHOR CONTRIBUTIONS:

Authors' contributions All of the authors included in the research have made a significant and direct intellectual contribution to the work and has agreed to publish it.

CONFLICTS OF INTEREST:

The authors declare and clarify that there is no conflict of interest.

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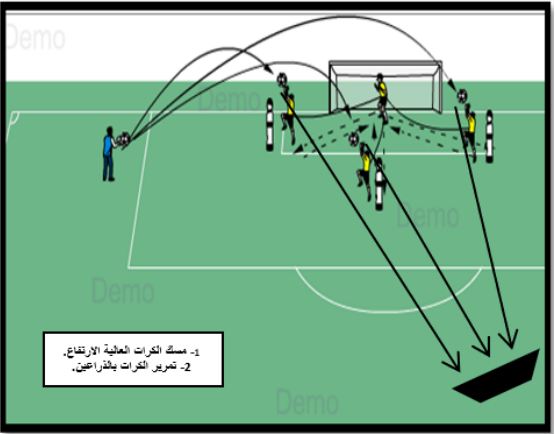
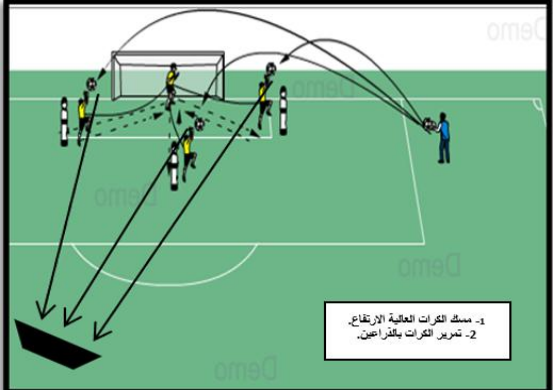
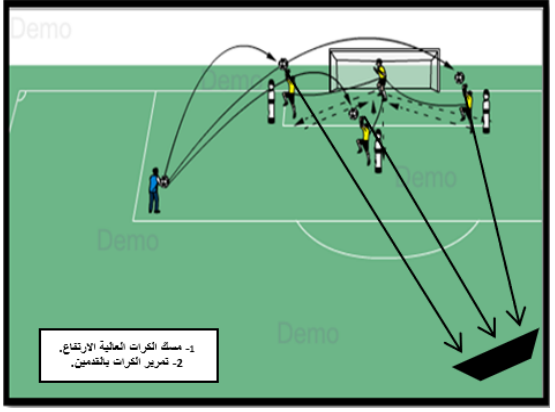
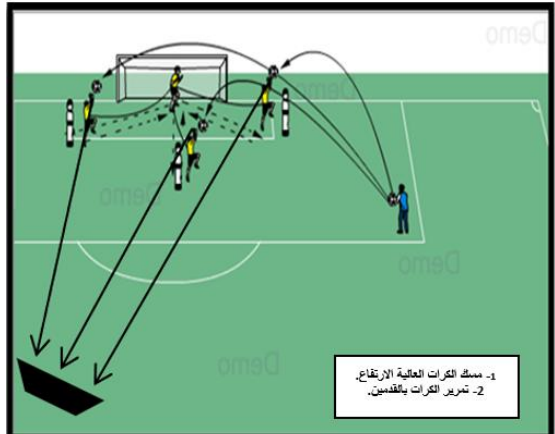
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Attachment (1): structured exercises with water weights (Tidal Tank)

NO	Exercise Details	Exercise Format
1	➤ Exercise Objective: 1- Developing physiological abilities. 2- Developing the skill of catching high front balls at head level. 3- Developing the skill of hand-rolling globes. ➤ Workout time: (30) seconds ➤ Training Tools: Goalkeeper (4), Football (16), Football Field Penalty Area, Water Weights (Tidal Tank), Spears (4), Barriers (35) cm High, Small Goal Goals (2). ➤ How to perform the exercise: The goalkeeper stands in a standby in the middle of the goal and is wearing a Water Weights (Tidal Tank) and when hearing the instruction to start by the coach, the goalkeeper moves sideways and skips the terraces with a height of (10) cm with both feet and in a lateral sequence of movement, then takes forward steps and then jumps with one foot over the barrier with a height of (35) cm placed on the line of the (6) Yard and from standby position, he performs the skill of holding the ball high at the level of the head and directed to the goal by a coach in the method of side flight, then he performs the skill of delivering the medium height ball by hand to the small side goal with the arm, then he returns to the goal and continues the performance of the exercise again.	 1-مسك الكرة العالية الارتفاع 2-تحرير الكرة بالذراعين EHAB MOHAMMED
2	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching high balls above head level. 3. Developing the skill of hand-rolling globes. ➤ Workout time: (30) seconds ➤ Training Tools: Goalkeeper (4), Football (16), Football Field Penalty Area, Water Weights (Tidal Tank), Spears (4), Barriers (35) cm High, Small Goal Goals (2). ➤ How to perform the exercise: The goalkeeper stands in a standby in the middle of the goal and is wearing a Water Weights (Tidal Tank) and when hearing the start instruction from the coach, the goalkeeper moves sideways and skips the terraces with a height of (10) cm with both feet and in a lateral sequence of movement, then takes forward steps and then jumps with one foot over the barrier with a height of (35) cm placed on the line of the (6) Yards and from standby position, he performs the skill of holding the high ball above the level of the front head and directed to the goal by a coach in the vertical jumping method, then he performs the skill of delivering the high ball with his hand to the small side goal with his arm, then he returns to the goal and continues to repeat the performance of the exercise again.	 1-مسك الكرة العالية فوق مستوى الرأس 2-تحرير الكرة بالذراعين DR- EHAB MOHAMMED
3	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching high front balls at head level. 3. Developing the skill of kicking balls from the ground. ➤ Workout time: (30) seconds ➤ Training Tools: Goalkeeper (4), Football (16), Football Field Penalty Area, Water Weights (Tidal Tank), Step (10 cm) Height (4), Indicator (4), Obstacle (35 cm) Height (1), Small Goals (4). ➤ How to perform the exercise: The guard stands next to the left post and is wearing a Water Weights (Tidal Tank) and when hearing the start instruction from the trainer, the guard moves sideways and skips a step with a height of (10) cm with both feet and in a lateral sequence of movement, then takes forward steps and then jumps with both feet over the barrier with a height of (35) cm placed on a line. The (6) yard and from the standby position, he performs the skill of holding the ball high at the level of the head and directed to the goal by a coach in the method of lateral flight, then he performs the skill of delivering the medium height ball with his hand to the small side goal with the arm, then he returns to the right post and continues to repeat the performance of the exercise for the other side.	 1-مسك الكرة العالية بمستوى الرأس 2-تحرير الكرة بالقدمين DR- EHAB MOHAMMED
4	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching high balls above head level. 3. Developing the skill of kicking balls from the ground. ➤ Exercise time: (25) seconds ➤ Training Tools: Goalkeeper (4), Football (16), Football Field Penalty Area, Water Weights (Tidal Tank), Step (10 cm) Height (4), Indicator (4), Obstacle (35 cm) Height (1), Small Goals (4). ➤ How to perform the exercise: The guard stands next to the left post and is wearing a Water Weights (Tidal Tank) and when hearing the start instruction from the trainer, the guard moves sideways and skips a step with a height of (10) cm with both feet and in a lateral sequence of movement, then takes forward steps and then jumps with both feet over the barrier with a height of (35) cm placed on a line. The (6) yards and standby position perform the skill of holding the ball high above the level of the forward and directed head the goal is scored by a vertical jumping coach and then performs the skill of delivering the high ball by hand to the small side goal with the arm, then returns to the right post and continues to repeat the performance of the exercise for the other side.	 1-مسك الكرة العالية فوق مستوى الرأس 2-تحرير الكرة بالقدمين DR- EHAB MOHAMMED

NO	Exercise Details	Exercise Format
5	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching side balls high above head level. 3. Developing the skill of hand-rolling globes. ➤ Workout time: (30) seconds ➤ Training Tools: (4) Goalkeepers, (16) Football Fields, Football Field Penalty Area, Tidal Tank, Human Indicator (Balloon Doll) (3), Step (1), Small Goals (2). ➤ Method of performing the exercise: The goalkeeper stands in a standby in the middle of the goal and in the direction of the right side of the field and is wearing a Water Weights (Tidal Tank) and when hearing the instruction to start by the coach, the goalkeeper skips the platform (step) with the feet in succession, then takes steps close to it and performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he gets up after that. By performing the skill of delivering the high ball with the hand to the small side goal with the arm, then returning to the goal and continuing the repeat performance of the exercise again.	
6	➤ Exercise Objective: 1. Develop physiological abilities. 2. Developing the skill of catching side balls high above head level. 3. Developing the skill of hand-rolling globes. ➤ Workout time: (30) seconds ➤ Training Tools: (4) Goalkeepers, (16) Football Fields, Football Field Penalty Area, Tidal Tank, Human Indicator (Balloon Doll) (3), Step (1), Small Goals (2). ➤ Method of Exercise: The goalkeeper stands in a standby in the middle of the goal and in the direction of the left side of the field and is wearing a Water Weights (Tidal Tank) and when hearing the instruction to start by the coach, the goalkeeper skips the platform (step) with the feet in succession, then takes steps close to it and performs the skill of holding the high ball above the level of the side head and directed to the goal by a coach in the method of vertical jumping, and then he gets up Perform the skill of hand-handing the high-height ball to the small side goal with the arm, then return to the goal and continue the practice repeat.	
7	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching side balls high above head level. 3. Developing the skill of kicking balls from the ground. ➤ Workout time: (30) seconds ➤ Training Tools: (4) Goalkeepers, (16) Football Fields, Football Field Penalty Area, Tidal Tank, Human Indicator (Balloon Doll) (3), Step (1), Small Goals (2). ➤ Method of performing the exercise: The goalkeeper stands in a standby in the middle of the goal and in the direction of the right side of the field and is wearing a Water Weights (Tidal Tank) and when hearing the instruction to start by the coach, the goalkeeper skips the platform (step) with the feet in succession, then takes steps close to it and performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he gets up after that. By performing the skill of kicking the ball in the air without falling it on the ground with the foot to the small side goal with the foot, then returning to the goal and continuing the repeat performance of the exercise again	
8	➤ Exercise Objective: 1. Developing physiological abilities. 2. Developing the skill of catching side balls high above head level. 3. Developing the skill of kicking balls from the ground. ➤ Exercise time: (30) seconds, ➤ Training Tools: (4) Goalkeepers, (16) Football Fields, Football Field Penalty Area, Tidal Tank, Human Indicator (Balloon Doll) (3), Step (1), Small Goals (2). ➤ Method of performing the exercise: The goalkeeper stands in a standby in the middle of the goal and in the direction of the right side of the field and is wearing a Water Weights (Tidal Tank) and when hearing the instruction to start by the coach, the goalkeeper skips the platform (step) with the feet in succession, then takes steps close to it and performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he performs the skill of holding the high ball above the level of the lateral head and directed to the goal by a coach in the method of vertical jumping, and then he gets up after that. By performing the skill of kicking the ball in the air without falling it on the ground with the foot to the small side goal with the foot, then returning to the goal and continuing the performance repeat the exercise again.	

Attachment (2): Training Module (First)

Month: First

The objective of the training module: to develop the abilities (physiological skill) of goalkeepers in football.

Week: First

Training Unit Intensity: (70-80) %

Date: 29/11/2025

Pulse of the training unit: (140-160) n/d

Day: Sunday

Total Training Module Time: (120) minutes

Time: (3) PM

Independent Variable Time: (52) minutes

#	Training Module Section	Exercises	Time to repeat one exercise	Exercise Reps	Exercise Totals	Molecular Intensity of Exercise	Partial Pulse of Exercise	Rest between repetitions	Comfort between groups	Total Rest Time	Total Working Time	Total Workout Time	Rest between workouts	Work System
1	Department Main (90) Minute	Exercise (1)	(30) Seconds	2	3	% 70	140 S/M	0	(60) Seconds	(120) Seconds	(180) Seconds	(300) seconds	(60) Seconds	Exchange
2		Exercise (2)	(30) Seconds	2	3	% 75	150 S/M	0	(60) Seconds	(120) Seconds	(180) Seconds	(300) seconds	(60) Seconds	Exchange
3		Exercise (3)	(30) Seconds	2	3	% 75	150 S/M	0	(60) Seconds	(120) Seconds	(180) Seconds	(300) seconds	(60) Seconds	Exchange
4		Exercise (4)	(25) Seconds	2	3	% 80	160 S/M	0	(90) seconds	(180) Seconds	(150) Seconds	(330) Seconds	(90) seconds	Exchange
5		Exercise (5)	(30) Seconds	2	3	% 80	160 S/M	0	(90) seconds	(180) Seconds	(150) Seconds	(330) Seconds	(90) seconds	Exchange
6		Exercise (6)	(30) Seconds	2	3	% 75	150 S/M	0	(75) seconds	(150) Seconds	(180) Seconds	(330) Seconds	(60) Seconds	Exchange
7		Exercise (7)	(30) Seconds	2	3	% 75	150 S/M	0	(75) seconds	(150) Seconds	(180) Seconds	(330) Seconds	(60) Seconds	Exchange
8		Exercise (8)	(30) Seconds	2	3	% 75	150 S/M	0	(75) seconds	(150) Seconds	(180) Seconds	(330) Seconds	(60) Seconds	Exchange

$$\text{Target Pulse Equation} = \frac{\text{Maximum pulse} \times \text{required intensity}}{100}$$

$$\text{Target Pulse Equation} = \frac{200 \times \%70}{100} = 140 \text{ S/M}$$

$$\text{Target Pulse Equation} = \frac{200 \times \%70}{100} = 150 \text{ S/M}$$

$$\text{Target Pulse Equation} = \frac{200 \times \%80}{100} = 160 \text{ S/M}$$

- The maximum pulse rate for the goalkeepers in the first month of the first intermediate course was determined with a period of four weeks and the maximum pulse rate was (200) beats/minute, by means of a special test for that implementation and the completion of the metered exercise vocabulary.