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"The effect of a training program with a variety of resistance methods on the level of physical and physiological competence and the Record level of lifeguards"

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The study aims to suggestion a training program using different resistance methods, whether with body weight or with tools and devices (calisthenics - variable resistance), and to know its effect on the level of physical efficiency, physiological efficiency, and record level of lifeguards. The researcher also used the experimental method, and the study population included those enrolled in the lifeguard program (Beaches - Swimming pools) affiliated and accredited by the Egyptian and International Federation for Diving and Lifesaving in 2023 from the ages of 18 to 25 years, the study sample was chosen intentionally and numbered (12) qualified for lifeguard's as one experimental sample. The results of the study also showed a positive effect on physical variables (back muscle strength (66.56%) - abdominal muscle strength (95.37%) - front leg muscle strength (23.17%) %) - Strength characterized by speed in the arms (66.38%) - Strength characterized by speed in the legs (17.09%)- Flexibility of the torso (127.79%)- Agility (31.24%)- Compatibility (37.5%), and in physiological variables (pulse at rest (11.34%) - Pulse after exertion (3.98%) - Maximum oxygen consumption (Vo2 Max) (37.03%) - Vital capacity (30.38%) And in the record level variables (test (200) meters swimming, crawling on the stomach (43.94%) - Test (25) Underwater swimming meter (146.96%) - Tube rescue kit (62.92%) - Dummy rescue kit and pulling it (52.92%),The efficiency of those qualified to join the lifeguard's program under study was also raised, as they passed the lifeguard's tests approved by the Egyptian and International Federation for Diving and Lifesaving with high efficiency.

Keywords: Resistance methods - Calisthenics - variable resistance exercises - Lifeguard.

"The effect of a training program with a variety of resistance methods on the level of physical and physiological competence and the Record level of lifeguards"

Introduction and problem study:

The primary role of lifeguards around the world is to lifesaving people who are in danger in the aquatic environment. Out of concern for human life and out of concern for it, it was necessary to develop a strategy to reduce drowning incidents. Therefore, the International Diving and Lifesaving Federation developed a strategy to reduce drowning incidents through a code Securing bodies of water is a set of requirements and standards that must be met on beaches and swimming pools that are used by citizens in order to ensure that the body of water is safe and suitable for use. The first step of this strategy is the presence of a lifeguard as a mandatory condition while working in swimming pools or beaches in sufficient numbers. The lifeguard must be physically and technically qualified and hold a lifeguard's course from the Egyptian Diving and Lifesaving Federation.

Harald Vervaik (2019) states that the International Life Saving Federation (ILS) is the federation that supervises the sport of Life Saving, which encourages Life Guards to develop and improve the necessary natural and mental skills required to save life in the aquatic environment, Life Guards have worked to compete with each other since the lifesaving groups were first established, and the communication was formulated. Through this sport, great progress has been made in providing international exchanges of information on correct life-saving practices. Life-saving sports include youth and adults from all countries in the mutual pursuit of excellence in life-saving. The global focus on cooperation and teamwork to reduce drowning is an indisputable opportunity. Increasing youth participation in life-saving sports is part of the participation strategy. (14 :2-4)

Drowning is also a common cause of death, and it is one of the three leading causes of accidental death in the world. Nearly twelve million people around the world find themselves annually in emergency situations in the water. Nearly 10% of them, i.e. more than 1,200,000, do not They manage to survive, and thus they die due to drowning, and we find that almost half of these are children and young people. (14:1-1)

Essam Abdel Khaleq (2005) points out the need for the coach to focus on strengthening the working muscle groups of his players, and this requires complete knowledge of both the function of the working muscles and choosing the appropriate training for them that is similar to the form of actual performance (8:48).

As Amrallah Ahmed Al-Basati (2015) mentioned, muscular strength and its basic components must be developed, through which achievement is increased according to the exercises directed to establish an appropriate level of muscular base that allows the player's endurance and the development of skill performance, in accordance with the requirements of the specialized activity. (15:138)

While MATT SCHIFFERL (2020) explained that calisthenics exercises are the freedom to train anytime and anywhere you want without being restricted to the gym, and harnessing full control over your body, whether in its condition or capabilities, as it is the way in which you relieve a little stress every... A day, or it may be the way you keep yourself active, energetic, and muscular. It includes strength, mobility, endurance, and flexibility. It is a comprehensive training method for physical attributes. It is infinitely adjustable and customizable to include anything from push-ups and distance running. 5 km to practice yoga on the beach or enjoy a casual walk in nature. Unlike other exercises, they require body weight exercises. It also only requires some open space on the ground and the force of gravity. (21:11)

Calisthenics *exercises also depend on modern methods of fitness, as they tend to divide the body into many small parts in an attempt to focus on each specific area. Common fitness routines also include separate exercises for each muscle in the body, in addition to strength, ability, flexibility, and mobility exercises. Endurance, stability and functional fitness. (21:14)*

While Walid Muhammad Daghim's study (2023) (16) indicated that the results of the proposed training program using calisthenics training had a positive impact on the experimental research sample in improving physical variables, improving some physiological variables, and improving the digital swimming level of the butterfly in the 100m butterfly time.

The study of Samah Kamel Ibrahim Abu Steita (2023) (6) confirmed that the use of calisthenics training had a positive effect on the study sample in improving physical and skill variables.

The study of Ramin Aghajani et al. (2014) (23) indicates that the average explosive strength and strength in the plyometric and resistance training groups compared to the control group, the amount of improvement in the resistance training group was more than the plyometric group.

The study of Andreas Nikolakakis et al. (2020) (22) also confirmed the importance of using elastic bands in improving muscle coordination and physical control in both male and female athletes and contributed decisively to improving forehand strikes, and also led to improving the performance of young athletes.

As Muhammad Abdo (2012) points out, resistance training is considered one of the modern training methods used to develop muscular ability, as one of its advantages in training is that it has many characteristics compared to traditional strength training, whether static or dynamic. (10: 312)

Lee Brown (2007) believes that resistance training is necessary to maintain muscle strength and health and is also useful for strengthening bones, tendons and ligaments. Resistance training gives the appropriate strength and energy to perform basic functional activities. It is useful in competing in sports competitions, as many exercises can be performed that suit The needs of every sporting activity. (20:131)

Amr Saber (2021) points out that many resistance training programs instruct athletes on the need to move the external resistance as quickly as possible to achieve adaptation in the rate of force development (RFD). However, one of the main shortcomings of this methodology is that a large portion of the range of motion is consumed. In slowing resistance, the training method that addresses the period of deceleration and the need for the rate of force development is called RFD variable resistance training or Accommodated resistance (9:48).

Abu Al-Ela Abdel Fattah (1997) points out that variable resistance training varies to include plyometric training, isokinetic training, various resistances, free weights, hydraulic devices, pressure devices, pneumatics, and weight sticks (1: 263).

Mufti Ibrahim (1998) states that modified resistances are movements performed against a variety of different resistances according to different angles. The muscular force exerted varies according to the extent of the movement's performance. (12: 146)

Coker et al. (2006) point out stated that added resistance training, which is a modified resistance method, has become more popular among athletes as a potential alternative to traditional training methods. In this method, chains are added to the free barbell next to the barbell hoops, or they are added to the barbell as a full load. (17: 887).

As Mai Talat Talba's study (2020) (13) indicates, the use of variable resistance training contributed positively to improving the physical and skill performance of tennis juniors.

Also, Walaa El-Din Ali's study (2022) (15) confirms that variable resistance training led to improving the basic motor abilities of table tennis players, as skill variables improved by percentages ranging from 700972% to -99.354%

From what was previously presented, and through the researcher's work as an international lifesaving trainer certified by the Egyptian and International Federation for Diving and lifesaving, and his work as a teacher at the Faculty of Physical Education, Beni Suef University, Water Sports Department, and a swimming coach at the Wadi Degla Club, the researcher witnessed the great and noticeable development of the Egyptian and International Federation for Diving and lifesaving in raising the efficiency of life guards, The field and practical tests that applicants pass to join the lifeguarding profession have been developed to include all the physical and physiological aspects and the record level of lifeguards, They are evaluated and prepared for the labor market through training and tests established in a standardized manner by the union, which contributes to preserving the lives of those who frequent swimming pools and also the beaches, this necessarily requires planning the training programs offered to those joining the lifeguard's profession in accordance with the vision and modern perspective of the Egyptian Diving and lifesaving Federation in developing the competence and ability of life guards, Therefore, the researcher proposed the use of a training program with a variety of methods of resistance with body weight and with tools and devices, namely (callisthenic exercises), which is one of the forms of physical training. Which uses body weight as resistance and (variable resistance exercises), which is one of the forms of resistance, which is represented by different types of free weights and various devices and tools, and which is derived, codified and planned according to the modern perspective of the tests of the Egyptian and International Federation for Diving and lifesaving and

knowing its impact on the level of physical and physiological competence and the record level of those joining the profession lifesaving.

Aims:

The study aims to suggestion a training program using different resistance methods, whether with body weight or with tools and devices (calisthenics - variable resistance), and to know its effect on:

1- The level of physical competence in (muscular strength of the back, abdomen and legs - strength characterized by speed in the arms and legs - flexibility - agility - coordination) of the lifeguards under study.

2- Physiological efficiency (pulse at rest and pulse after maximum effort (200 meters swimming, belly crawl - maximum oxygen consumption Vo2 Max - vital capacity) of the lifeguards under study.

3- The record level for the performance time and distance (200) meters of belly crawl swimming - (25) meters of underwater swimming - a tube rescue sentence and pulling a drowning person - a dummy rescue sentence and pulling it) for the lifeguards under study.

Hypotheses:

1- There are statistically significant differences between the average scores of the pre- and post-measurements in the physical efficiency variables to post means

2-There are statistically significant differences between the average scores of the pre- and post-measurements in the physiological variables to post means.

3-There are statistically significant differences between the average scores of the pre- and post-measurements in the record level variables to post means.

terms:

Resistance methods under study:

1- Callisthenic Exercises:

Matt Schifferl (2020) defines it as a form of physical training that uses your body weight for resistance. Instead of using weights or external devices to create resistance, you use the body's resistance to improve fitness. The term CALISTHENICS also comes from the two Greek words callus, which means "beauty" and sthenos, which means "strength", so calisthenics means a beautiful form of strength training which is "advanced body weight training" (21:10).

2-Variable resistance:

Abdul Aziz Al-Nimr and Nariman Al-Khatib (2006) define it as variable resistance exercises that require the body's muscles to move or attempt to move against one of the forms of resistance, which is represented by different types of free weights, different devices, and tools (7:56).

Physiological variables under study:

1-Heart rate (HR)

Ahmed Nasr El-Din Sayed (2014) defines it as the rate of propagation of expansion waves from the aortic wall when blood rushes into it from the left ventricle to the walls of the arteries within one minute. The heart rate ranges between 60-80 beats per minute at rest in normal people. (4:113).

2-Maximum Volume Oxygen Consumption (Vo2 Max):

As Ahmed Nasr El-Din Sayed (2003) defines it, it is the maximum volume of oxygen consumed in liters or milliliters per minute when performing an aerobic physical load in which more than 50% of the body's muscles participate. (3:217).

3-Vital Capacity (VC)

Muhammad Sobhi Hassanein (2004) defines it as the maximum volume of air that can be exhaled during the exhalation process, after taking the maximum inhalation, and it is estimated at about (4500) milliliters (normal breathing + inhalation reserve + exhalation reserve). This reflects the safety of the body's respiratory systems. (11:47).

Drowning:

As known by E.F. van Beek, and et al. (2005) that it is the process of suffering from respiratory disorders as a result of immersion in a liquid. For victims who survive a drowning accident, the term is used (non-fatal drowning) and the term (near-drowning) is no longer used. (18: 801-880).

Lifeguard:

Harald Vervaik (2019) defines him as a person who can supervise swimming environments and work preventively and thus prevent accidents, help people in case of danger and work in accordance with safety regulations and priority requirements to ensure the safety of visitors in the swimming environment, and can also benefit from the knowledge of the lifeguard in the event of accidents outside Swimming environment. (14:15-1).

Methods:

Study Methodology:

The researcher used the experimental method due to its suitability to the nature of the study. He also used the experimental design for one experimental group by following the pre- and post-measurements.

Study Community:

The study community is represented by those enrolled in the lifeguard's program (beaches - swimming pools) affiliated and approved by the Egyptian and International Federation for Diving and lifesaving in the year (2023) from the age of (18) to (25) years.

Study sample:

The study sample was selected from within the study community in a deliberate manner, and their number was (18) qualified for lifeguards and enrolled in the lifeguard's program (beaches - swimming pools) affiliated and accredited by the Egyptian and International Federation for Diving and lifesaving in 2023 in Beni Suef Governorate, whose ages ranged between (18) and (25) years, and who are required to pass the initial test to join the lifeguard's program, as the sample was divided into an experimental group, numbering (12) qualified for lifeguard's and a survey group, numbering (6) qualified for lifeguards, A distinguished survey group was also used from outside the research community, numbering (6) swimmers and lifeguards accredited by the Egyptian Federation for Diving and lifesaving, in order to find (validity - reliability) of the physical, physiological and record tests under study.

Homogeneity of sample individuals:

The researcher studied the characteristics of all individuals in the study sample by finding the skewness coefficient, and Table (1) shows this:

Table (1) The arithmetic mean, standard deviation and skewness coefficient of the sample members' scores (basic exploratory) in the physical and physiological variables and the record level under study (n=18)

Variables under study		*Unit*	*mean*	*Standard deviation*	*skewness*
Growth rates	*Age*	*year*	20.83	2.587	.106
	Height	*cm*	174.83	5.951	.348
	Weight	*kg*	79.08	9.614	.439
Physical variables	*Back muscle strength*	*kg*	75.55	3.467	-.129-
	Abdominal muscle strength	*number*	40.69	6.929	-.020-
	Foreleg muscle strength	*kg*	101.76	7.216	-.205-
	Speed strength of arms	meter	8.42	.688	.026

	Speed strength of legs	*cm*	172.00	2.374	-.293-
	flexibility (forward trunk flexion)	*cm*	9.75	2.261	-.138-
	Agility (Barrow test)	second	9.89	.387	.177
	Coordination (Record circuit test)	second	5.36	.398	.669
Physiological variables	*Resting pulse*	P / M	70.50	3.605	.000
	Pulse after effort	P / M	181.83	2.124	-.354-
	Vo2 Max	L / M	4.05	.369	1.272
	Vital capacity	liter	4.18	.391	-.205-
Record level variables	*Test (200) meters swimming crawl*	second	468.33	45.891	.129
	Test 25 meters underwater	meter	11.37	2.487	-.396-
	Rescue tube pull set	second	219.16	24.293	.070
	Rescue Doll Pull Back Set	second	238.83	43.561	.105

Table (1) shows that the values of the skewness coefficient for the sample individuals' scores (basic - exploratory) in the physical and physiological variables and the record level under study were limited to (±3), which indicates the normality of the data distribution.

Data collection tools:

Reference survey:

The researcher reviewed previous and similar studies as well as specialized Arab and foreign scientific research and references and the characteristics of the age group of the sample under study.

Tools.

methods and devices:

A restameter to measure height in centimeters - An electronic medical scale to measure weight in kilograms - A dynamometer to measure muscle strength - A numbered measuring tape - A 5-kilogram medicine ball - A graduated box - A pulse oximeter - A dry spirometer - A treadmill - Chalk and cones - A Casio stopwatch (1/100) of a second An Olympic swimming pool (50) meters long and (25) meters wide divided into (10) lanes - A rescue T-shirt - A rescue tube and a rescue dummy approved by the Egyptian Federation for Diving and lifesaving.

Registration forms:

- The researcher designed combined forms to record data on those qualified for lifeguards.

Methods of measuring study variables:

The researcher reviewed some scientific references (3), (4), (11) to determine the most important methods of measuring physical and physiological variables and the record level of the sample under study.

1- Physical efficiency level:

Muscular strength was measured using a dynamometer - and the strength characterized by speed using two tests: the broad jump for the legs - pushing the medicine ball (5) kg for the arms - and flexibility using the forward trunk flexion test from above a scale box - and agility using the Barrow test - and coordination using the record circuit test.

2- Physiological variables:

Where the pulse was measured using a pulse oximeter to measure the heart rate during rest and after maximum effort (200) meters of crawl swimming on the stomach - vital capacity using a dry spirometer - maximum oxygen consumption VO2 max using the (Strand) test on the moving belt and using the following equation: Maximum oxygen consumption = (time x 1.444) + 14.99 and time refers to the time of running on the moving belt until reaching the stage of fatigue.

3- Record level variables:

Where (200) meters of crawl swimming on the stomach were measured - and a drowning rescue sentence with a tube - and a dummy rescue sentence using a calibrated record watch (Casio 1/100 second stopwatch), and a (25) meter underwater swimming test was measured by distance.

Implementation steps of the study:

The exploratory study:

The researcher conducted the exploratory study during the period from Tuesday (23/5/2023) until Tuesday-Thursday (1/6/2023), where some physical and physiological measurements and the record level were conducted on the distinguished and non-distinguished exploratory sample for the purpose of training assistants on preparing the tools - adjusting the devices and tools used in conducting the study - finding the coefficients of validity and reliability for the tests under study.

Scientific transactions (validity - reliability) for the tests under study:

Validity of the tests:

The researcher applied the tests under study on (3) days, Tuesday, Wednesday and Thursday (23 - 25 / 5 / 2023) to the survey sample, numbering (6) qualified to join the rescue program and from within the study community and outside the basic sample, A distinguished survey sample was also used from outside the study community, numbering (6) swimmers and lifeguards certified by the Egyptian Federation for Diving

and lifesaving, in order to calculate the validity of the differentiation of the tests used, and Table (2) shows this:

Table (2) Significance of differences between the averages of test scores for the exploratory sample members (the distinguished and non-distinguished groups) in the physical variables under study using the Mann-Whitney method (N1 = N2 = 6)

Tests	Groups	Mean Ranks	Sum of Ranks	U	Z	P	Level Significance
Back Muscle Strength Test with Dynamometer	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significant
	Special (n=6)	9.50	57.00				
Abdominal Muscle Strength Test with Dynamometer	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significant
	Special (n=6)	9.50	57.00				
Legs Muscle Strength Test with Dynamometer	Undifferentiated (n=6)	4.50	27.00	0.00	1.92	0.055	Significant
	Special (n=6)	8.50	51.00				
5 K Medicine Ball Push Test	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significant
	Special (n=6)	9.50	57.00				
Uncharacteristic Standing Broad Jump Test	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significant
	Special (n=6)	9.50	57.00				
Uncharacteristic Forward Trunk Bending Test	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significant
	Special (n=6)	9.50	57.00				
Uncharacteristic Barrow Agility Test	Undifferentiated (n=6)	9.50	57.00	0.00	2.89	0.004	Significant
	Special (n=6)	3.50	21.00				
Record Circuit Test for Undifferentiated Compatibility	Undifferentiated (n=6)	9.50	57.00	0.000	2.88	0.004	Significant
	Special (n=6)	3.50	21.00				

Table "Z" value at level (0.05) = 1.960

Table (2) shows the existence of statistically significant differences between the average scores of the distinguished group and the non-distinguished group in the tests of the physical variables under study in favor of the distinguished group, as the calculated "z" values exceeded their table value, which means the ability of these tests to distinguish between levels and thus achieve the validity of the physical tests under study.

Table (3) Significance of differences between the averages of test scores for the exploratory sample members (the distinguished and non-distinguished groups) in the physiological variables and the record level under study using the Mann-Whitney method (n1 = n2 = 6)

Tests	Groups	Mean Ranks	Sum of Ranks	U	Z	P	Level Significance
Resting pulse	Undifferentiated (n=6)	9.33	56.00	1.00	2.74	0.006	Significance
	Special (n=6)	3.67	22.00				
Pulse after effort	Undifferentiated (n=6)	3.50	21.00	0.00	2.89	0.004	Significance
	Special (n=6)	9.50	57.00				
Vo2 Max	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significance
	Special (n=6)	9.50	57.00				
Vital capacity	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significance
	Special (n=6)	9.50	57.00				
(200) meters swimming crawl	Undifferentiated (n=6)	9.50	57.00	0.00	2.88	0.004	Significance
	Special (n=6)	3.50	21.00				
Test 25 meters underwater	Undifferentiated (n=6)	3.50	21.00	0.00	2.88	0.004	Significance
	Special (n=6)	9.50	57.00				
Rescue tube pull set	Undifferentiated (n=6)	9.50	57.00	0.00	2.88	0.004	Significance
	Special (n=6)	3.50	21.00				
Rescue Doll Pull Back Set	Undifferentiated (n=6)	9.50	57.00	0.00	2.88	0.004	Significance
	Special (n=6)	3.50	21.00				

The tabular "Z" value at the level (0.05) = 1.960

Table (3) shows the existence of statistically significant differences between the average scores of the distinguished group and the non-distinguished group in the tests of the physiological and record variables under study in favor of the distinguished group, as the calculated "z" values exceeded their tabular value, which means the ability of these tests to distinguish between levels and thus achieve the validity of the physiological and record tests under study.

Test stability:

The researcher applied the tests under study on Tuesday, Wednesday and Thursday (23-25/5/2023) and they were reapplied on (30, 31/5/2023, 1/6/2023) with a time difference of (6 days) on the survey sample (non-distinctive) under study. Table (4) shows the following:

Table (4) The stability coefficient between the scores of the first application and the scores of the second application in the tests under study for individuals of the survey sample (non -distinctive) with a simple correlation coefficient (Spearman) (n=6)

Tests	Unit	First Application		Second Application		Correlation	Level Significance
		Mean	Standard Deviation	Mean	Standard Deviation		
Back Muscle Strength Test with Dynamometer	kg	75.37	4.205	75.28	4.450	0.943	0.005
Abdominal Muscle Strength Test with Dynamometer	number	40.44	8.661	40.47	8.778	1.000	0.000
Legs Muscle Strength Test with Dynamometer	kg	100.56	8.484	100.55	8.514	1.000	0.000
5 K Medicine Ball Push Test	meter	8.23	.590	8.04	.729	0.886	0.019
Uncharacteristic Standing Broad Jump Test	cm	171.50	2.880	171.16	2.994	0.986	0.000
Uncharacteristic Forward Trunk Bending Test	cm	9.00	2.366	8.66	2.422	0.986	0.000
Uncharacteristic Barrow Agility Test	second	10.00	.404	9.83	.524	0.928	0.008
Record Circuit Test for Undifferentiated Compatibility	second	5.54	.480	5.45	.529	0.986	0.000
Resting pulse	P / M	70.50	4.505	70.33	4.082	0.986	0.000
Pulse after effort	P / M	181.16	2.316	179.33	4.966	0.928	0.008
Vo2 Max	L / M	4.05	.503	4.02	.523	0.943	0.005
Vital capacity	liter	4.09	.470	4.15	.527	0.829	0.042

The tabular "R" value at the level (0.05) = 0.866

Table (4) shows that the correlation coefficients between the scores of the study sample individuals in the first application and the scores of the study sample individuals in the second application of the physical and physiological tests under study ranged between (0.829 - 1.000) as the calculated "R" values exceeded their tabular value at a significance level of 0.05, which means the stability of the test scores under study.

Pre-measurement:

The pre-measurement was implemented on the experimental study group by measuring the study variables on the experimental sample individuals at the Beni Suef Sports Club swimming pool and they were recorded in the forms designated for these measurements on (3) days Friday, Saturday and Sunday (2 - 4 / 6 / 2023).

1-The first day: The physical variables under study on Friday (2 / 6 / 2023).

2- The second day: Physiological variables under study on Saturday (6/3/2023).

3- The third day: record level variables under study through initial tests for lifeguard's qualification on Sunday (6/4/2023).

Basic study experience:

The training program for the study was applied to the experimental sample under study during the period from Tuesday (6/6/2023) until Tuesday (1/8/2023) for (8) weeks at the headquarters of the Beni Suef Sports Club swimming pool.

Training Program:

It aims to suggestion a training program with a variety of resistance methods using body weight and tools and devices, namely (Calisthenics exercises), which is a form of physical training that uses body weight as resistance, and (Variable Resistance Exercises), which is a form of resistance represented by different types of free weights, different devices and tools, derived, standardized and planned according to the modern perspective of the Egyptian and International Diving and lifesaving Federation tests and knowing its impact on the level of physical and physiological efficiency and the record level of the lifeguard's under study.

Preliminary steps for the training program:

The researcher conducted a survey study and reviewed the International Lifeguard's Guide approved by the International Diving and lifesaving Federation (14) and some modern scientific references specialized in the field of training, especially swimming training, and also used them to form training loads on the sample under study.

Bases for developing the training program:

The training program was planned according to the physical, physiological and record requirements that must be available in lifeguard's in order to pass the International lifeguard's tests approved by the International Diving and lifesaving Federation, and Figure No. (1) shows this:

Test Score Sheet (Pool lifeguard – Beach lifeguard)

International lifeguard score monitoring table

n	Test number	1-Swimming pool lifeguard test	1-Beach lifeguard test	2	3	4
	Name	Swimming (200) meter (5) minute	Run – swimming with Fins – run (200) meter (8) minute	Under water swimming	Tube Rescue Group(1.30) minute	Rescue group dummy And he pulled it (2) minute
		250 Score	250 Score	100 Score	200 Score	200 Score
1						
2						

Figure (1) International Lifeguard's Test Scores Form approved by the International Diving and Lifesaving Federation.

The characteristics of the age group of the sample members, the flexibility of the program and its ability to be modified, and the determination of the load degrees and the method of its formation were also taken into account with great precision.

The training content of the training program:

Table (5) Time and size of the training program, including *callisthenic* exercises and resistance training

	Warm-up	*callisthenic*	variable resistance	water exercises	cool-down	Total
Time	475.2 minutes	323 minutes	323 minutes	928.8 minutes	110 minutes	2160 minutes
Percentage of time	22%	14.95%	14.95%	43%	5.09%	100%
Water training size	5400 meters	—	—	27000 meters	3600 meters	36000 meters
Percentage of water workout volume	15%	—	—	75%	10 %	100%

Table (5) shows the total time of the program (2160) minutes and the total training volume of the program (36000) meters, where the warm-up time ranged from (475.2) minutes (22%) and the volume of (5400) meters (15%) of water training. The time of the *callisthenic* exercises ranged (324) minutes (14.95%), the time of the variable resistance exercises ranged (324) minutes (14.95%), and the time of the water exercises ranged (928.8) minutes (43%), with a size of (27000) meters, (14.95%). (75%) of the water exercises, and the time of the cool-down exercises ranged (110) minutes, representing (5.09%) of the

time, and the size of (3600) meters, representing (10%) of the water exercises.

Time content of the training program:

The duration of the training program is (2) months, with (8) training weeks, with (24) training units - and the duration of the training units is (90) minutes.

The following is an example of a training unit within the training program:

Unite N	Time unite	Today	History	Volume	intensity	Goals
1	90M	Tuesday	6/6/2024	1500 M	Medium	C/R/S

Unit parts	activity	intensity	Distance / Rips	Rips / Sets	Rest	Goals of Exercise
Warm up	Crawl Stroke	40%	75M	2	45 S	EN1
	Drills	50%	25M	3	30 S	EN 1
main set (1)	Crunches – core routine - Burpees	85 %	20 C	3	1 M	calisthenics
	Rubber bands - Free weights	85 %	20 C	3	1 M	variable resistance
main set (2)	Crawl Stroke	60 %	100M	4	2 M	EN1
	Drills	50 %	100M	3	1.30 M	EN1
	Crawl Stroke	75 %	50M	8	40 S	EN 2
Cool Down	Free Style	30%	50M	3	40 S	R

Bases for evaluating the training program:

The basis for evaluating the training program was established according to the lifeguard's' evaluation form approved by the International Diving and Lifesaving Federation, as shown in Figure (2).

Test Score Sheet (Pool lifeguard – Beach lifeguard)

Table for compilation of final Score

–The final score for the tests (10 tests) is 1500 degrees
-Passing score of (900) degrees with a score of 65%.
- All tests must be passed, and failure in one test requires retaking the test
- Description of the tests, measurement ruler, and time in a separate form from this form

#	Name	Total scores(Pool lifeguard)	Percentage(Pool lifeguard)	Total scores(Beach lifeguard)	Percentage(Beach lifeguard)	Final result(Beach lifeguard)	Final result(Beach lifeguard)
		1500 point	%	1500 point	%	Successful = 60%	Successful = 60%
1							
2							

Figure (2) International Lifeguard Test Evaluation Score Form (Swimming Pool - Beaches)

Post-measurement:

The post-measurement was implemented on the experimental study group by measuring the study variables on the experimental sample members at the Beni Suef Sports Club swimming pool and recorded in the forms designated for these measurements on 3 days, Wednesday, Thursday and Friday corresponding to (2 - 4 / 8 / 2023) in two stages:

The first stage:

1-The first day: The physical variables under study on Wednesday (2 / 8 / 2023).

2-The second day: The physiological variables under study on Thursday (3 / 8 / 2023).

The second stage:

On the third day corresponding to (4 / 8 / 2023) the record variables of those qualified for lifeguard's were measured by recording the results of the lifeguard's tests approved by the Egyptian Diving and lifesaving Federation.

Statistical treatments used in the study:

The researcher performed statistical treatments, where the researcher was satisfied with the level of significance (0.05). He also used the Spss program to calculate some statistical coefficients. The following statistical treatments were also used (arithmetic mean - standard deviation - skewness coefficient - non-parametric statistical method (Mann Whitney test - Spearman test - Wilcoxon test) Percentage of change (percentage of improvement).

Results:

Table (6) Significance of the differences between the average scores of the sample members of the experimental group for the pre- and post-measurements in the physical variables under study using the Wilcoxon method. (n=12)

Variables	Measurement	mean	Average ranks	Trend	Values	Sum of values	Z	P	Significance level
Back Muscles	Before	75.55	0.00	-	0	0.00	3.101	0.002	Significance
	After	125.84	6.50	+	12	78.00			
Abdominal Muscles	Before	40.69	0.00	-	0	0.00	3.059	0.002	Significance
	After	79.50	6.50	+	12	78.00			
Front Leg Muscles	Before	101.76	12.00	-	1	12.00	2.119	0.034	Significance
	After	125.34	6.00	+	11	66.00			

Speed Strength of Arms	Before	8.42	0.00	-	0	0.00	3.061	0.002	Significance
	After	14.01	6.50	+	12	78.00			
Speed Strength of Legs	Before	172.00	0.00	-	0	0.00	3.062	0.002	Significance
	After	201.41	6.50	+	12	78.00			
Trunk Flexibility	Before	9.75	0.00	-	0	0.00	3.057	0.001	Significance
	After	22.25	6.50	+	12	78.00			
Agility	Before	9.89	6.50	-	12	78.00	3.088	0.002	Significance
	After	6.80	0.00	+	0	0.00			
Coordination	Before	5.36	6.50	-	12	78.00	3.089	0.002	Significance
	After	3.35	0.00	+	0	0.00			

Tabular Z value at level $(0.05) = 1.960$

Table (6) shows the presence of statistically significant differences between the average scores of the pre- and post-measurements of the experimental group in the physical variables under study and in favor of the average scores of the post-measurements as the error probability values are smaller than the significance level (0.05).

Table (7) Significance of the differences between the average scores of the sample members of the experimental group for the pre- and post-measurements in the physiological variables and the record level under study using the Wilcoxon method. (n=12)

Variables	Measurement	mean	Average ranks	Trend	Values	Sum of values	Z	P	Significance level
Resting pulse	Before	70.50	6.50	+	12	78.00	3.065	0.002	Significance
	After	62.50	0.00	-	0	0.00			
Pulse after effort	Before	181.83	0.00	-	0	0.00	3.077	0.002	Significance
	After	189.08	6.50	+	12	78.00			
Vo2 Max	Before	4.05	0.00	-	0	0.00	3.059	0.002	Significance
	After	5.54	6.50	+	12	78.00			
Vital capacity	Before	4.18	0.00	-	0	0.00	3.059	0.002	Significance
	After	5.45	6.50	+	12	78.00			
Test (200) meters swimming crawl	Before	468.33	6.50	+	12	78.00	3.078	0.002	Significance
	After	262.50	0.00	-	0	0.00			
Test 25 meters underwater	Before	11.37	0.00	-	0	0.00	3.063	0.002	Significance
	After	28.08	6.50	+	12	78.00			
Rescue tube pull set	Before	219.16	6.50	+	12	78.00	3.062	0.002	Significance
	After	81.25	0.00	-	0	0.00			
Rescue Doll Pull Back Set	Before	238.83	6.50	+	12	78.00	3.062	0.002	Significance
	After	112.66	0.00	-	0	0.00			

Tabular Z value at level $(0.05) = 1.960$

Table (7) shows the existence of statistically significant differences between the average scores of the pre- and post-measurements of the

experimental group in the physiological variables and the record level under study in favor of the average scores of the post-measurements as the error probability values are smaller than the significance level (0.05).

Table (8) The percentages of change between the average scores of the sample members of the experimental group for the pre- and post-measurements in the physical, physiological and record variables under study (n = 12)

Variables under study		Unit	Arithmetic mean of pre-measurement	Arithmetic mean of post-measurement	Improvement rate%
Physical variables	*Back muscle strength*	*kg*	75.55	125.84	66.65%
	Abdominal muscle strength	*number*	40.69	79.50	95.37%
	Foreleg muscle strength	*kg*	101.76	125.34	23.17%
	Speed strength of arms	meter	8.42	14.01	66.38%
	Speed strength of legs	*cm*	172.00	201.41	17.09%
	flexibility (forward trunk flexion)	*cm*	9.75	22.25	127.79%
	Agility (Barrow test)	second	9.89	6.80	31.24%
	Coordination (Record circuit test)	second	5.36	3.35	37.5%
Physiological variables	*Resting pulse*	P / M	70.50	62.50	11.34%
	Pulse after effort	P / M	181.83	189.08	3.98%
	Vo2 Max	L / M	4.05	5.54	37.03%
	Vital capacity	liter	4.18	5.45	30.38%
record level variables	*Test (200) meters swimming crawl*	second	468.33	262.50	43.94%
	Test 25 meters underwater	meter	11.37	28.08	149.96%
	Rescue tube pull set	second	219.16	81.25	62.92%
	Rescue Doll Pull Back Set	second	238.83	112.66	52.92%

Table (8) shows that the percentages of improvement between the average scores of the sample members of the experimental group in the pre- and post-measurements in the physical, physiological and record variables under study ranged between (3.98% - 146.96%).

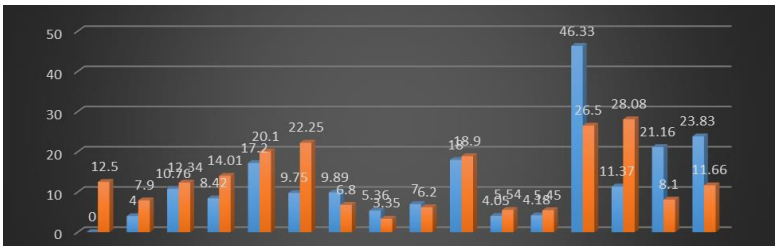

Figure (3) The percentages of change between the average scores of the sample members of the experimental group in the pre- and post measurements in the physical, physiological and

record variables under study.

Discussion:

Through the objectives and hypotheses of the study, the researcher was able to discuss and interpret the results as follows:

It is clear from Tables (6), (7) , (8) and Figure (3) the following:

There are statistically significant differences between the averages of the pre- and post-measurement scores of the experimental group in favor of the averages of the post-measurement scores, as the percentage of improvement in the physical variables reached (back muscle strength (66.56%) - abdominal muscle strength (95.37%) - front leg muscle strength (23.17%) - arm speed strength (66.38%) - leg speed strength (17.09%) - trunk flexibility (127.79%) - agility (31.24%) - coordination (37.5%).

There were also statistically significant differences between the averages of the pre- and post-measurement scores of the experimental group in favor of the averages of the post-measurement scores, as the percentage of improvement in the physiological variables reached (resting pulse (11.34%) - pulse after Effort (3.98%) - Maximum oxygen consumption Vo2 Max (37.03%) - Vital capacity (30.38%)

Also, there were statistically significant differences between the average scores of the pre- and post-measurements of the experimental group in favor of the average scores of the post-measurements, as the percentage of improvement in the variables of the record level reached the (200) meter crawl swimming test (43.94%) - the (25) meter underwater swimming test (146.96%) - the rescue sentence with the tube (62.92%) - the lifeguard's sentence of the dummy and pulling it (52.92%)

Also, the percentages of improvement between the average scores of the sample members of the experimental group in the pre- and post-measurements in the physical, physiological and record variables under study ranged between (3.98% - 146.96%).

The researcher attributes these positive results to the impact of the training program with the diversity of resistance methods using body weight and tools and devices, namely (calisthenics exercises), which is a form of physical training that uses body weight as resistance, and (variable resistance exercises), which is a form of resistance represented by different types of free weights and different devices and tools, derived, standardized and planned according to the modern

perspective of the Egyptian and International Federation of Diving and lifesaving tests and appropriate for the study sample, which contributed to improving the level of physical efficiency, the improvement rate of which ranged between (17.09% - 127.79%), and the improvement rate in physiological variables ranged between (3.98% - 37.03%), and the improvement rate in record variables ranged between (43.94% - 146.96%) for the sample qualified to join the lifeguards program under study, which was reflected in the positive impact on their passing the lifeguards test approved by the Egyptian and International Federation of Diving and lifesaving with high efficiency according to the indicators and results of the study.

These results are consistent with the study of Walid Muhammad Daghim (2023) (16) that the use of calisthenics training had a positive effect on the experimental research sample in improving physical variables, improving some physiological variables, and improving the record swimming level of the butterfly in the 100 m butterfly time.

The results of the study are also consistent with the study of Samah Kamel Ibrahim Abu Steita (2023) (6), which aims to identify the effect of calisthenics training on some physical variables and the level of skill performance on the floor movements device among artistic gymnastics juniors, as the results showed a positive effect on the research sample in improving physical variables and skill variables.

These results are also consistent with what was indicated by Matt Schiffer (2020), which is that calisthenics exercises work to increase strength in each muscle in the lower part of the body. In addition, it develops movement and stability in the hips, ankles and knees, and provides a wide range of training benefits in strength, mobility, endurance and flexibility, and has many benefits by improving the ability to transfer, freedom and flexibility, and is also an effective exercise for the entire body. (21: 14)

The results of the study are also consistent with what was indicated by the results of Wallace BJ, et all (2006) (24) that resistance training using variable resistances has a special place in many training programs and has an effective impact on actual performance and it is possible to perform and integrate it into training along the range of sports movement with the aim of correcting and improving many sports movements.

The results of this study also agree with what Muhammad Abdo (2012) indicated that resistance training is considered one of the modern training methods used to develop muscle strength, as one of its advantages in training is that it is characterized by many characteristics through traditional strength training, whether fixed or moving, and one of the characteristics of variable resistance training is that it provides control over high resistance during training and starts with the easiest resistance and then the most difficult, as variable resistance devices can make the muscles work at contraction rates similar to the contraction rate used during competition, and are considered completely suitable for exercises performed at high speed or as quickly as possible, and variable resistance contractions do not usually result in muscle pain. (10: 312)

The results of the study also agree with what Jordan Joy et al. (2016) (19) reached, which is that the most important reason for using modified resistance training is its ability to improve the strength characterized by speed. As increasing central resistance (shortening contraction) leads to the player's need to accelerate continuously.

These results are also consistent with what Wallace, et al (2006) (24) found that modified resistance training using elastic bands led to an increase in bone strength and bone capacity when compared to resistance training without elastic bands.

The results of the study are also consistent with what was indicated by Ibrahim Salem, Abdel Rahman Abdel Hamid, Ahmed Salem (1998) that the efficiency of muscles in consuming oxygen is considered one of the important capabilities required for physical activity to endure performance for a long period, as consuming oxygen efficiently means saving energy and facing fatigue to the maximum degree, and thus the body can perform physical effort with a high degree of efficiency. (2:17)

Ahmed Nasr El-Din (2003) also mentions in the results of the study that the tests measuring the maximum oxygen consumption (MARO) are the most important physiological tests that express the efficiency of the body's functional systems through the ability of the body's organs to absorb oxygen through inhaled air and transport it by blood from the lungs to the muscles to produce aerobic energy. (3:66)

These results are consistent with what Harald Verveik (2019) indicated that lifeguards need to demonstrate an appropriate level of physical fitness, and lifeguards are supposed to have swimming and

lifeguard's skills in the water. It has been proven that the ability of lifeguards to swim a distance within a specific period of time is closely related to the success of the tasks, and tests that are concerned with measuring swimming ability have shown that there is strong evidence from the results to support its inclusion in the fitness tests for lifeguards, although most lifeguard's in open water, which involve swimming, are likely to occur within 100 meters of the shore, and it is important that the lifeguards are able to reach the victim efficiently and return themselves and the victim to the shore, and lifeguards in open water are exposed to many environmental risks in performing lifeguard's operations that require them to be fit enough. (14:15-16)

Conclusions:

1- There are improvement rates between the average scores of the pre- and post-measurements in the physical variables (back muscle strength (66.56%) - muscle strength Abdominal (95.37%) - Front leg muscle strength (23.17%) - Arm speed strength (66.38%) - Leg speed strength (17.09%) - Trunk flexibility (127.79%) - Agility (31.24%) - Coordination (37.5%), and in physiological variables (resting pulse (11.34%) - Pulse after effort (3.98%) - Maximum oxygen consumption Vo2 Max (37.03%) - Vital capacity (30.38%) and in record level variables (test (200) meters crawl swimming on the stomach (43.94%) - test (25) meters swimming underwater (146.96%) - rescue sentence with a tube (62.92%) - rescue sentence of a dummy and pulling it (52.92%)

2- Raising the efficiency of those qualified to join the lifeguard's program under study as they passed the lifeguard's tests approved by the Federation Egyptian and International Diving and Lifesaving with high efficiency.

Recommendations:

1- The necessity of taking into account when raising the efficiency of lifeguard's, planning and implementing training programs that qualify lifeguard's using the diversity of resistance methods under study, as they have a positive impact on raising the physical, physiological and record efficiency of lifeguard's, and that the study be a scientific and practical reference that can be taken into consideration when training and qualifying lifeguards from lifesaving trainers.

2- The researcher recommends presenting the study to the Board of Directors of the Egyptian Diving and lifesaving Federation, as it has scientific and practical importance that can contribute to further development and improvement of the efficiency of lifeguards.

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