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EFFECT OF THE TRAINING PROGRAM ON STRENGTH IMPROVEMENT RELATED TO THE CRAWL STROKE ON FEMALE PHYSICAL EDUCATION FACULTY STUDENTS AT YARMOUK UNIVERSITY

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Key words: Training program, Strength endurance, Maximum Strength, and Speed Power (Ability), Crawl stroke.

Abstract

The purpose of this study is to determine the effect of aquatic aerobic training on the development of certain types of strength (strength endurance, capacity, maximum strength). In connection with the crawl swimming in the School of Sports for Female Students at Yarmouk University, the researcher used an experimental method because it is related to the nature of the research. The sample is selected from (20) female students majoring in swimming who are enrolled in the summer semester (2020/2021). In order to analyze the results, the researcher used the pre-event t-test (SPSS). The results show that water aerobic training has a positive effect on the development of the study sample (strength endurance, ability and maximum strength); post-testing is performed. Researcher recommended aerobic training for other physical health elements, games and swimming structures.

Key words: Training program, Strength endurance, Maximum Strength, and Speed Power (Ability), Crawl stroke.

Introduction

Motion is a manifestation of daily life. Without movement, we cannot fulfill the requirements of life that help in survival and continuity. It is a prerequisite for the growth and development of the physical, mental and motion of the human body, and the person learns a lot of daily motor skills that help him fulfill his own needs. In addition to the fact that sports exercises help to develop and improve physical health, it can also help change his behavior. In order to make the individual achieve better performance for any type of motion, modern methods must be used to improve the required performance. Special training is required to develop and improve the individual in all aspects (Al-Qat, 2002).

Sport plays an important role in the development of physical characteristics and is considered to be the basis for preparing skills and mental processes for any group or individual motion. Therefore, it can be said that sports and water sports are one of the most important means to improve the physical level of individuals because they move in water media. The human body moves from the arms and legs to the trunk, which is to improve the physical, psychological capabilities of the human body (Rizk, 2003).

Some scholars believe that muscle strength is one of the most important physical qualities of an individual because of its impact on other physical characteristics (such as speed, endurance, and ability), especially in activities related to the use of muscle strength. (Allawi, 2000) In addition, strength is one of the basic requirements for swimmers to reach the championship level. Speed is those complex functional components that enable individuals to perform dynamic performance in the shortest time. If we combine the elements of strength and speed, we will have the so-called speed power (ability) (Allawi, 2003) year.

Similarly, endurance refers to the ability of the breathing cycle in the sports field, because it is a physiological factor in the basic physical elements such as strength, flexibility, power, and ability. It is closely related to them, and the ratio of endurance motion percentage varies according to the person engaged in The type of sport (Ahmed, 1999). Swimmers with slow fibers have a better

chance in endurance competitions, but this characteristic is reduced in fast competitions (Rizk, 2003).

Importance of the study: Swimming is a sport with distinctive characteristics in many countries in the world (especially developed countries); compared with other types of swimmers, the greatest interest in crawl stroke is the fastest. The importance of this research is emphasized by explaining the impact of the training program on the development of strength types (maximum strength, muscular endurance, speed power (ability)) related to Crawl Stroke to increase speed and improve digital achievement.

Study problem: Through the researcher's introduction to many recent scientific studies and reference materials, as well as her work as a swimming instructor, and overseeing the swimming courses at the Faculty of Physical Education in cooperation with the local community, the researcher noticed outstanding problems at this level. Physical ability of female students enrolled in the swimming course of Yarmouk University is manifested by the weakness of the students' muscle strength, which has a negative impact on the performance of crawl stroke. Based on that, the researcher applied a training program on aerobic to measure the impact of this program on improving the strength which enhances the fitness elements in crawl stroke.

Study Objectives: This study aimed to;

1. understand the impact of the proposed training program on the development (strength endurance) on female swimming students.
2. identify the impact of the proposed training plan on the development (maximum strength) on female swimming students.
3. understand the impact of the proposed training plan on the development of the speed power (ability) on female swimming students.

Study Hypotheses:

1. There is a statistically significant difference in the significance level ($\alpha \leq 0.05$) of the impact of swimming training program on the development (strength endurance) of the Pre and Post the measurements of female swimmers.

2. There is a statistically significant difference in the significance level ($\alpha \leq 0.05$) of the impact of the training item on the development (maximum strength) of the Pre and Post measurements of female swimmers.
3. There is a statistically significant difference in the significance level ($\alpha \leq 0.05$) of the influence of the training item on the development speed power (ability) of the Pre and Post measurements of female swimmers.

Methods:

Swimming sport includes many different distance competitions in each of the four swimming methods, and each competition includes the following phases (start, swimming distance, turn and final phase), learning and acquiring swimming skills face some difficulties regarding floating, movement, forward and swimming on. Therefore, swimming is different from other sports. It effectively uses muscle strength to achieve good performance by reducing motion. Facing the resistance of the swimmer's water, it helps to move forward faster, which requires complete alignment between the nervous and muscular systems, and requires the use of mental ability to perceive important parts of the skill by focusing and improving its level to improve all sports performance of skills and reduce performance time (Ibrahim, 2000). Hammad (2001) pointed out that the importance of muscle strength helps to improve other physical qualities, such as strength endurance, maximum strength and speed power (ability), and is an important determinant of achievement in most sports and enabling them to complete any motion. The type of physical performance in all sports is different. The percentage of contribution is based on performance type. Martens and Daly (2012) have shown through research that due to the development of muscle strength, it is possible to develop the characteristics of the translational speed of short-distance athletes. It is proved that the speed of swimming start and turn phase is greatly affected by muscle strength, so the attempt to develop muscle strength characterized by speed is an important factor to help develop power ability. (ALRabadi, 2015). Crawl stroke swimming is considered to be the fastest type of competition swimming. In competitions, swimmers often try to swim at high speeds that exceed the record time, so they move their arms faster in the air outside the water and their swimming

performance is excellent. Muscle tension, they may actually expose swimming blows to the lack of real performance in the water environment, which will reduce their speed. Therefore, good swimmers must maintain technical balance, a strong sense of tension, and use swimming postures to produce the fastest movement in the water (Ungerechts, Volck and Freitag, 2009).Aerobic training for swimming sport depends on the waveform of the training load, and fluctuation means the increase and decrease of the training load intensity, rather than a single walk, and no matter how the training method and method change, it depends on a determination based on the main energy system during physical motion(Judith and Grayston ,2014) (AlRabadi 2018). Therefore, according to (Al-Bustami, 1998) and (Al-Bassati, 2001), training can be divided into basic types: 1. Anaerobic training: including physical motion characterized by extreme or sub-maximum intensity, and for a short period of less than minutes, in which energy production depends to a large extent on the anaerobic system. It is represented by the phosphate system (ATP-CP) and the lactic acid system (lactic acid).2. Aerobic training: It includes motion of moderate to less than the maximum amount of motion for more than minutes, depending on the power in the aerobic system, (Zaletal 2013) and the energy in the aerobic system depends on the oxygen in the air to generate energy. On this basis, physical characteristics can be divided into anaerobic characteristics and capabilities. These characteristics and capabilities depend on their training in anaerobic power systems, while other aerobic characteristics depend on their aerobic systems in power Training. Muscle activity lasted more than five minutes (Abu Al-Ela, 2003). In the training program, it is best to perform aerobic motion after anaerobic motion to make use of its physiological characteristics in the rehabilitation process.Likewise, the improvement of anaerobic motion capacity and characteristics is based on a broad aerobic capacity basis, which is the basis for establishing appropriate functional adaptability to transfer the training load from training volume to intensity motion (Bhaskarabhatla, 2002)(Scalf , et.al , 2012). Due to the continuous performance of muscle work during long-term swimming, swimming is regarded as one of the aerobic motions. Therefore, the level of swimmers, whether from physiological or physiological aspects, mainly depends on the ability of the

circulatory system and respiratory system.(Shabrawi, 2020) and (Salama, 2000) emphasized the importance of physical preparation, because it helps to discover functional abilities and determine how well the trainee prepares for his motion, and guide it to match these physical abilities and the preparation required by the trainee Match the destination. (Hassan, 2001) and (Taha et al., 1989) Supporting aerobic motion has a positive effect on body building, gaining good strength. In addition, it has a direct effect on important body systems and improves the level of physical ability. They do not need special Function or tool.

Aqua sports in the swimming pool has been expanded to include a variety of activities (Tokmakidis, 2004), including walking or jogging in the water, pacemaker motion, aerobic motion and strength training. Mervat (1990) confirmed that aerobic motion is the workload of the respiratory and circulatory system, requiring a longer period of performance (more than three minutes), and its effectiveness and adaptation to the heart muscle to pump more blood as the respiratory system adapts to more effective work. Aerobic motion also relies on the respiratory and circulatory system to deliver oxygen to the working muscles and remove various chemical products (Bahaa El-Ding, 2000).

The current research is different from the previous research. It has designed a training program to develop the strength related to crawl stroke of female students in the Faculty of Physical Education at Yarmouk University and measure its impact on the development of muscle strength and power.

Study design:

This section discusses research methods, societies and samples, tests used and indications of their validity and consistency, identification of research variables and procedures, and descriptions of statistical methods used to verify their validity hypotheses.

Research methods:

To facilitate research purposes, the researcher uses experimental methods.

Participants: The research population includes all female students studying swimming at Yarmouk University in the first half of 2020/2021, and their number (20).

Research sample:

The research sample was deliberately selected from female students who participated in the swimming course in the first semester (2020/2021). The researcher selected 20 students. Table (1) shows the arithmetic mean, standard deviation and sum Skewness and Kurtosis. The skewness value is used to characterize the research sample.

Table (1): mean, standard deviation, and Skewness and Kurtosis values characterize research samples

Variable	Measuring unit	Lowest value	Highest value	Mean	Std. Deviation	Skewness	Kurtosis
height	**cm**	**156**	**173**	**166.65**	**4.46**	**0.911-**	**0.625**
weight	**kg**	**59**	**69**	**63.90**	**3.17**	**0.025-**	**1.017-**
age	**year**	**19**	**22**	**20.60**	**0.99**	**0.128-**	**0.884-**

Table (1) shows that the length of the study sample is between (156-173) cm, the arithmetic mean of the length variable is (166.56±4.46), and the Skewness and flattening values reach (-0.911 and 0.625), This is an acceptable value indicating the homogeneity of the sample members. The weight of the research sample is between (59-69) kg, where the arithmetic mean of the weight variable is (63.90±3.17), and the Skewness and kurtosis values are (-0.025, -1.017) respectively, which is an acceptable representation of the sample The value of member homogeneity. The ages of the research sample members are between (19-22) years old, and the arithmetic mean of the age variable is (20.60±0.99), and the skewness and kurtosis values are (-0.128 and -0.884), respectively, which are acceptable values Indicates the homogeneity of the sample members.

Tools used: Yarmouk University Swimming Pool, with a length of (25) meters, a scale used to measure the weight of each student, a meter used to measure the length of the sample, a whistle, electronic stopwatch, auxiliary tools (Pullboy board), shoes,

Paddles, kick boards, a bottle of water), form to record test results, stretch cords.

Procedures: The researcher performed the following tasks:-In order to determine the research object, in the first semester of 2020/2021, the following points were taken into consideration: the total number of female students in the swimming course was restricted to (20), the tools were ascertained to be available to implement the study, and the researcher received a great assistance to conduct the Pre and Post measurements for this research.

Location: the swimming pool 25 m at the Facility of Physical Education at Yarmouk University, Jordan.
Duration: Summer semester (2020-2021).

Exploratory Research: The researcher conducted an exploratory study on a sample of (12) students from outside the study sample in the period between February 6, 2020 and June 14, 2020, in order to insure the validity of tools, tests and applications of the study, and the difficulties that the researcher may encounter during the application of the study, to identify the time required to perform the test, and to check the stability of the tests.

Verification of skill tests: In order to verify the effectiveness of skill tests and training plans, the researcher introduced them to a group of experts in the swimming field to determine their applicability to the measured data and information. Furthermore, the researcher took into consideration the opinions of experts and made some suggested adjustments.

Test stability: in order to verify the stability of learning tests, the researcher applied them twice to a pilot sample composed of (12) students with a time difference of approximately two weeks, and then extracted the correlation coefficient between the applications (Pearson, to reveal repeated stability (Test R. Test), Table (2) illustrates this.

Table (2): Repetitive stability coefficient of learning tests (correlation coefficient between applications) (n = 12)

Stability factor	Tests	Measurement method

0.90**	Strength Endurance (swimming 100m)	(Crawl stroke) Number of arm cycles in the third phase (25 m)
0.89**	Pull stretch cords (maximum strength)	The number of pulls for a period of one minute
0.84**	power (ability) 25 m distance	(Crawl stroke) Time 25m (s)

** Statistically significant at the level of significance ($\alpha \leq 0.01$).

Table (2) shows that the correlation coefficient between these applications is very high, and between (0.84-0.90), which shows the stability of the acceptable degree of research testing.

Pre-testing: the researcher conducted pre-testing on the research samples in the Yarmouk University pool on June 15, 2020.

Design training program: The training plan is formulated with reference to some previous related studies, and training units are organized to implement these units within a prior time plan, taking into account planning the elements and contents of the training units, including activities and exercises that serve the goals of the program such as: strength endurance, maximum strength, and speed power (ability).

Certification of training program: In order to verify the validity of the training plan, it has been submitted to (3) refereed experts in the field of swimming, and the program has been reformulated in its final form.

Application of the program: The implementation cycle of the plan is eight weeks, with (4) training units per week. Each unit has a time of (45 minutes) and the duration is from June 14, 2020 to August 13, 2020. Including courses (32 training units).

Carrying out size test: After the end of the planned implementation period, the size of the research test will be measured under the same conditions in which the pre-measurements were made.

Independent variable factors: training program using aerobic motion

Dependent variable factors: type of strength (strength endurance, maximum strength, and speed power (ability).

Tests Used:

1- The first test: strength endurance from the edge of the swimming pool (swimming 100 meters), when you hear the whistle, the students swim, crawl stroke 25 meters away, and calculate the number of arm cycles in a 25-meter pool, Calculate the arm distance from the distance covered in the third stage (from the total distance).

The second test: standing open-bending the trunk forward-holding the stretch cords with both hands, pulling it back to the farthest, and calculating the number of pulling times per minute.

(The stretch cords (maximum strength of the arm)

The third test: the recorded speed power (ability) from the edge of the swimming pool push, swimming on crawl stroke 25 m.

Data analysis: In order to achieve the purpose of the research, the following statistical methods (mean, standard deviation, and Kurtosis and kurtosis values) are used to identify the individual variables of the research sample and the homogeneity of the sample, and the Paired-sample T test that is used to determine the difference between measurements (pre-test and post-test) of the individual of the original research sample.

Results:

This part includes the introduction of the research results, which are designed to determine the impact of aerobic motion on the development of the strength types related to crawl stroke swimming at the Faculty of Physical Education, and the research results are based on the proposed hypotheses, which are as follows:

The first hypothesis: There is a statistically significant difference in the level of significance ($\alpha \leq 0.05$) between the measurements (Pre and Post), which is important for the development of certain types of strength (strength endurance) in female swimming students advantageous measuring. In order to verify the validity of this hypothesis, a paired sample T test was applied to the performance (number of arm cycles) of the sample members to withstand the strength endurance of the Pre and Post measurements. Table (3) illustrates this.

Table(3):(Paired sample T test) Application in the study of sample performance to withstand the Strength Endurance of measurements (Pre and Post) in Crawl stroke (n = 20)

measurement	Measurement unit	mean	Std.Deviation	T	significance
Pre	**circle**	**21.60**	**1.53**	**10.860**	**0.00**
Post	**circle**	**19.05**	**1.05**		

As can be seen from the previous table, the value of (T) is equal to (10.860), which is the value measurement (Pre and Post) of the statistical function used to express the bearing capacity of members at the ($\alpha \leq 0.05$) level, which shows There is a statistically significant difference between these measurements (Pre and Post). For the purpose of telemetry, and therefore, the training program proposed has the effect of developing the strength endurance of the research sample. Thus accepting the first hypothesis of the research.

The second hypothesis: there is a statistically significant difference in the significance level ($\alpha \leq 0.05$) between the measurements (Pre and Post), which is beneficial to the later measurement for female swimming students. In order to verify the validity of this hypothesis, the paired-sample T test was applied to study the performance of the maximum strength of the sample individual in measurements (Pre and Post). Table (4) illustrates this.

Table(4)Application of paired sample T test in test (maximum strength). Pull the stretch cords the rubber cord in dimensions (front and back) with both arms (n = 20)

measurement	Measurement unit	mean	Std.Deviation	T	significance
Pre	**once**	**30.50**	**2.91**	**5.294**	**0.00**
Post	**once**	**33.65**	**2.75**		

As can be seen from the previous table, the value of (T) is equal to (5.294), which is at the level ($\alpha \leq 0.05$) for the performance of the sample members in the test (at speed) in measured values (front and back) Pulling the elastic rope with both arms in the middle shows that there is a statistically significant difference between the measured values (front and back), and is conducive to the post-measurement. The arithmetic mean is the post-measurement (33.65), and The arithmetic average of the pre-measurement reached (30.50), which indicates that the proposed training plan has an impact on the development of the speed intensity characteristics in the research sample, and thus the second hypothesis of the research is accepted.

The third hypothesis: the significance level ($\alpha \leq 0.05$) of the measurement values (Pre and Post) is statistically significantly different, which is conducive to later measurement for female swimming students. In order to verify the validity of this hypothesis, the paired-sample T-test was applied to the performance of individual samples of the speed power (ability) in measurements (Pre and Post). Table (5) illustrates this.

Table(5) The application of the paired-sample T test on the power (ability) of speed (forward floating) and measurements to record the time of crawl stroke swimming at a distance of 25 m (n = 20)

Tests	measurement	Measurement unit	mean	Std. Deviation	T	significance
The power of speed swimming	**Pre**	**second**	**29.80**	**2.58**	**9.903**	**0.00**
Crawl stroke	**Post**	**second**	**28.15**	**2.45**		

(25m)						

Table (5) shows that the value of (T) has reached (9.903), which is the performance of the sample member at the level of (α≤0.05), and the maximum intensity between the Pre and Post measurements, which indicates that the measurements (There is a statistically significant difference between the Pre and Post measurements). The mean of the post-measurement reached (28.15) seconds, and the arithmetic mean of the predicted amount reached (29.80) seconds, which indicates that the proposed training procedure has an impact on the speed power (ability) related to time, crawl stroke .The distance of 25 meters, among the members of the research sample, therefore accepts the first hypothesis of the research.

Results of discussion:

The results of the study will be discussed based on the proposed assumptions, which are as follows:

The first hypothesis: There is a statistically significant difference in the significance level (α≤0.05) between the measured values (Pre and Post). This is the female swimming student's strength endurance) Development, and after scientific measurement.

The researcher used various exercises with and without tools and considered frequency and intensity, and focused on the best technical performance during the training process. This contributes to the development of muscle strength, which depends on the development of strength and endurance where the components of the training load include the quality of the tool used in anaerobic training program, its intensity and the duration of performance. These results are consistent with Zaletal (2013) and Research results of (Judith & Grayston, 2014).

The second hypothesis: there is a statistically significant difference in the significance level (α≤0.05) between the measurements (Pre and Post), which is beneficial to the later measurement for female swimming students.

The results related to this hypothesis indicate that there is an effect of the training, which is accomplished by using different components of the training program load with different intensities

and frequencies. It should be noted that (Reischle, 2000) various forms of stretch cords can improve technical performance and improve the speed of swimmers, which, in turn, can improve the maximum strength when the stretch cords for resistance training are used during strength training.

The proposed training program helps to develop the strength of the arms, which in turn leads to an increase in the swimming distance for crawl stroke that is considered the product of the maximum strength of the arm muscles multiplied by a certain distance mentioned in (Dieter, 1999). Reduce distance. These results are consistent with the results of the Rabadi study (2018) to determine the effect of the proposed education program on improving the trunk angle in the undulation technique of breaststroke.

The third hypothesis: there is a statistically significant difference in the significance level ($\alpha \leq 0.05$) between the measurements (Pre and Post), which is beneficial to the later measurement for female swimming students. The results related to this hypothesis showed that the training program has an impact on the development of speed power (ability). The researcher attributed the development of skills and record level of students in the swimming courses of the faculty of Physical Education to the special crawl stroke at a distance of 25 meters to improve Skill level, which is one of the most important factors to help improve the record level, and to improve the training program method, intensity, repetitiveness, and the time that are applied in an organized and orderly manner to achieve the desired results and performance. (Ferenc, 2002) shows that there is a strong relationship between power and speed, especially in short distances.

Longer distances require strength and the ability to withstand speed. These results are consistent with the Shabrawi study (2020), which revealed the effect of a very short training speed on the morphological adaptation of swimming (50m) butterflies and certain functional responses.

Conclusion: Based on the results obtained, the researcher made the following recommendations: The training program has a positive and clear effect on the maximum strength of the arm, using water sports tools can improve the type of strength related to

swimming and crawl stroke, and the training program uses motions and auxiliary tools to improve performance of female students' record level.

Recommendations: Based on the results obtained, the following recommendations are made: When formulating a training program for its direct effects, it is very important to give arm muscles, which will increase the level of achievement, use training programs to develop physical variables related to the muscle strength of female students in Faculties and swimmers, and conduct more similar researches on men and women of different age groups and rely on standardized training programs to develop other fitness elements.

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