

Aquatic Exercise Program as a Way to Enhance Body Composition and a Little of the Changes in Obese Men, Chemical and Physically

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Abstract: The researcher wanted to examine the implications of an aerobic swimming training program on the body composition, biochemical, and physical fitness variables of obese men aged 40-45 years. A sample size of 12 subjects was chosen, and they were put through a 12 weeks aquatic training program, 3-4 sessions every week, 45 minutes to 60 minutes in duration, with progressive intensity and the use of aquatic aids in order to increase muscular resistance. The findings indicated significant changes, which were found statistically significant after the intervention such as decreases in weight, body mass index, body fat percentage and mass and increases in fat-free mass and body density. Biochemical results showed low levels of glucose and insulin, high levels of testosterone and low levels of cortisol. There was also the improvement of the physical fitness indicators such as cardiorespiratory endurance, muscular endurance of upper and lower limbs and abdominal muscles. The researchers concluded that aerobic aquatic exercise is effective and safe and its benefits are holistic, encompassing body composition, biochemical markers as well as physical fitness and should be introduced in the physical rehabilitation and exercise programs.

Keywords: Physical Fitness, Body Composition, Physical Exercise, Obesity, Biochemical Markers.

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INTRODUCTION AND SIGNIFICANCE OF THE RESEARCH

Obesity is one of the most common illnesses in the modern world due to the behavioral changes and sedentary lifestyles introduced by the modern technology, physical inactivity, and over-reliance on the comfortable methods of transportation and labor (World Health Organization, 2022). Obesity is discussed as one of the most severe health issues of the world because of the complications that it has, including the cardiovascular system, the metabolism, and psychological, and social well-being. In addition, it is a significant predisposing cause of chronic illnesses including diabetes, high blood pressure, and lipid disorders (Balchin, 2005; Sandreland, 2005). Research shows that diminished physical exercise is among the most conspicuous causal elements to the emergence of obesity, since a sedentary life gets combined with unhealthy nutritional consumption and mental exertion to worsen health issues (Williams *et al.*, 2010). Despite

the effectiveness of physical activity as a method of prevention and treatment, the obese population, especially those in the middle age (40-45 years), experiences challenges in performing the conventional methods of exercise because of the lack of fitness and the stress exerted on muscle and joints. This decreases compliance and causes the symptoms to linger on (Barela *et al.*, 2006). In this regard, the aquatic aerobic exercise has become a viable and safe means of training this group. Aquatic environment assists the body as well as offloading the joints and is also cardiorespiratory efficient. It has been proven that aquatic programs help to decrease body fat percentage, gain muscle mass, and enhance such biomarkers as glucose, cortisol, and testosterone, which have a positive effect on metabolic and hormonal balance (Colado *et al.*, 2013; Tsourlou *et al.*, 2006; NIH, 2020). The American College of Sports Medicine (2021) also suggested to adapt the exercise programs to the health status of obese persons, but at the same time, it underlines the advantages of aquatic exercise in enhancing the overall health status and a

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decrease in the risk factors. Even though such results have been found, a lack of research has been performed to investigate the impact of aquatic physical activity on middle-aged men, especially in relation to anthropometric, biochemical and physical markers. Moreover, there are no specialized studies of the field in the Arabic literature, which also points to the necessity of new research to fill this gap. Thus, the significance of the study is to have empirical scientific data about the effects of an aquatic training programme on various anthropometric, biochemical and physical markers in obese men (40-45 years old) to create safer and more effective training programs using this age group.

Research Problem

They include obesity as one of the most eminent chronic health issues in contemporary societies. According to the reports by World Health Organization (WHO) (2022), it is gaining popularity across the globe (especially in the middle-aged male population (40-45 years of age and middle-aged women (40-45 years of age) due to hormonal and physiological changes leading to the body becoming more prone to fat accumulation. This is associated with sitting and the poor dietary habits which cause severe complications like heart diseases, type 2 diabetes, lipid disorders and metabolic syndrome (Jakicic & Davis, 2011). Physical activity is a good measure of preventing obesity and related complications but the obese people usually have a problem in executing the traditional exercise because of excess weight, lack of fitness and strain on the joints. This decreases compliance and supports the risk of dropping out or becoming injured (Barela *et al.*, 2006; ACSM, 2021). Thus, there has been an emergence of the necessity of more appropriate training options. In that regard, aquatic aerobic exercise is a good alternative as it aids the body in the process of movement and relieves the mechanical effect of stress on the musculoskeletal system, preserving the efficiency of the cardiomyocardial system. The role of this exercise in bettering body composition, decreased fat, and alteration of some biochemical markers: glucose, testosterone, and triglycerides has been shown in many studies (Colado *et al.*, 2013; Tsourlou *et al.*, 2006). Nevertheless, such studies have largely concentrated on women or on the elderly with apparent lack of research on the impact of aquatic exercise on middle-aged men and especially on delicate physiological and biochemical modifications. Thus, the research issue at hand can be formulated as follows: How does an aquatic aerobic training program impact on physiological composition and some of the biochemical variables in obese men (40-45 years old)?

Research Objectives

1. To create a weight-loss aquatic exercise program that is appropriate to be used by obese men (40-45 years old).
2. To determine the impact of the program on the enhancement of some anthropometric variables

(BMI, body fat percentage, fat mass, density, and lean body mass).

3. To determine the impact of the program on some of the chemical variables (glucose, insulin, testosterone, and cortisol).
4. To determine the impact of the program on the enhancement of some physiological variables among the sample.

Research Hypotheses

1. The difference between the pre-test and the post-test is statistically significant in the anthropometric (body mass index, body fat percentage, fat weight, density, lean body mass) variables in favor of the post-test
2. The pre- and post-tests statistically differ in the chemical variables (glucose, insulin, testosterone, cortisol) in favor of the latter.
3. Some of the physiological variables show statistically significant differences between pre and post tests with the post-test being superior.

RESEARCH METHODOLOGY AND PROCEDURES

First: Research Methodology

The experimental approach was adopted by the researcher because it is the most appropriate in helping to answer the research problem and realize its objectives. A single experimental group had an experimental design, which was pre-test and post-test.

Second: Research Sample

The samples used in the research were chosen purposely and included men aged 40-45 years who were obese and of whom all members of the Men Fitness Center in the Maysan Governorate and had not previously used the center. There was a requirement of participation in any physical activity program or regular exercises. The original sample size was 20 subjects, and 2 were omitted due to medical check-up test, 3 were non-compliant, and 5 took part in pilot tests. As such, the ultimate number of individuals that participated in the research was 10; this number was the experimental group. Each of the participants was thoroughly tested by a professional physician in the Al-Sadr Hospital in Maysan Governorate to be sure of their health and competence to undertake the training program.

Third: Assessment of the Participants

- The participants shall be aged between 30 and 35, which is obese by the Body Mass Index (BMI).
- The respondents should be aged 40-45 years.
- The participants should be able to pass a clinical medical check and have no long-term conditions that would hinder them to do exercises.
- The subjects should not be undergoing any other training programs amid the study.

- Participants need to be totally dedicated to attend all training programs.
- The participants will be required to sign a consent form once the objectives and procedures of the study were discussed.

Fourth: Research Implementation Procedures

The researcher initiated the research together with the administration of the center in choosing the participants and under the arrangement of providing an appropriate training environment. Afterwards, every participant was taken through rigorous medical tests in the Chest Hospital under the supervision of a specialist physician to ascertain their health and capability to attend the training program. Then, participants signed a consent form after objectives of the study and the content of the

training program were explained. Prior to the commencement of the program, all the anthropometric, chemical, physical variables were pre-tested. The aquatic environment was used as a posttest after the training program implementation based on the schedule that was established and the results were compared statistically to analyze the effects of the program on the sample.

Fifth: Statistical Homogeneity Research Sample

To guarantee the homogeneity of the sample prior to the training program, the researcher statistically analysed the pre-tests of all the variables studied such as anthropometric, chemical and physical variables. Table (1) shows the statistical values of the variables, prior to the training program, which indicate the homogeneity of the sample and prove that they are appropriate to take part in the study.

Table 1: Pre-measurement of the research variables to the study sample (n= 10) with statistical significance.

Torsion coefficient	Arithmetic median	Standard deviation	Arithmetic mean	Unit of measurement	Variable
0.20	42.00	1.75	42.20	Year	Age
0.57	175.95	2.31	176.32	cm	Height
0.09	109.50	4.85	109.80	kg	Weight
0.07	35.20	1.75	35.33	kg/m ²	Body Mass Index
0.87	1.05	0.00	1.05	g/cm ³	Body Density
-0.84	23.20	1.27	23.21	%	Fat Percentage
-0.36	24.40	2.46	25.53	kg	Fat Weight
0.51	84.10	2.45	84.27	kg	Lean Weight
0.07	121.00	5.72	121.00	mg/dL	Glucose
0.19	25.50	3.68	25.70	μU/mL	Insulin
0.17	277.50	20.17	277.50	ng/dL	Testosterone
0.36	23.25	1.53	23.51	μg/dL	Cortisol
0.26	1535	78.90	1356	m ³	Cooper Test
0.01	11	1.90	10.50	number	Bend and Extend Arms from Inclined Prone Position
0.215	15	1.68	15.20	number	Sitting up from a lying position (with knees bent)
0.231	24	4.82	25.2	number	Bend and extend your knees from a standing position
0.18	25.62	1.54	25.48	ml/kg/min	VO2max

The results of the analyzed data indicated that the values of all skewness coefficients fell within statistically acceptable values (±1), which indicates that the distribution of data is close to normal distribution. Thus, it is possible to make a conclusion that the sample was homogeneous with the pre-test variables, which enhances the validity of pre-test and post-test comparison and proves the suitability of the sample in the context of the experimental study.

Sixth: Methods and Tools of Data Collection Data Collection Methods

In a bid to ensure objectivity and accuracy, the researcher used different scientific approaches to gather the research data. These methods included:

- Scientific sources
- The internet

- Personal interviews
- Tests and measurements
- Observation and experimentation are considered.
- Information forms
- Physical and weight training procedures.

Equipment and Tools Used

- Swimming earplugs, gloves, and eye protection.
- 2 kg medicine balls, and a series of weights with different degrees of weight.
- Ruler and a measuring scale with a ruler to measure length and a tape measure.
- Two Japanese electronic timers.
- A computer for data analysis
- A TOSOH AIA-360 (Japanese-made) chemical indicator analyzer.

- A C-4000 blood analyzer ARCHITECT.

Seventh: Steps and Field Procedures of Research

To carry out the research in a systematic manner, the researcher used the following steps to carry out the training program and measure the various variables of the sample:

Anthropometric Measurements

a- Height, weight and body mass index (BMI)

Height: Measured in a straight posture with the help of a ruler.

Body Mass Index (BMI) was determined based on the following formula: Weight (kg)/(Height (m) × Height (m)).

Table 2. Body Mass Index Classification Guide.

Body Mass Index (BMI)	Classification
Less than 18.5	Underweight
18.5 – 24.9	Normal Weight
25 – 29.9	Overweight
30 – 34.9	Class I Obesity
35 – 39.9	Class II Obesity
40 and more	Morbid Obesity

The Essential Information Required is BMI. <Human>B. Measuring Body Composition: established details needed are BMI.

The researcher employed the measure of skinfold thickness in three major locations namely chest, abdomen, and anterior thigh.

Calculation of Body Density with Jackson-pollock formula of men:

$$\text{Body Density} = 1.10938 - (0.0008267(\text{Sum of the Three Folds}) - (0.0000016(\text{Sum of the three folds square}) - (0.0002574 \text{ Age}) - (0.0002574 \text{ Age Square})).$$

Fat Percentage: By Siri Formula:

$$\text{Body Fat Percentage (\%)} = (457 / \text{Body Density}) - 414.2.$$

Fat Weight: Body Fat Weight = (percent fat weight x total weight) / 100.

Guidelines Used to Measure Skinfolts

- Measurements to be done should be taken at the right side of the body.
- Measurement must be done thrice and then the mean calculated.
- Measurements The measurements are to be taken at the same time every day to reduce changes in the environment or exercise.
- All people should be equipped with the same equipment and tools.
- Before measurements, no physical activity is to be conducted.
- Measurement points are to be written with the help of a pen and removed after measurement.

Thickness: The measurement of the thickness should be taken with a Skinfold Caliper to a nearest value of 0.5 mm.

Physical Tests

Prone Arm Flexion Test

Purpose To test the strength of the arm and shoulder muscles. (Al-Tarabili, 2005)

Equipment: Stopwatch.

Performance: The participant starts in a modified prone position whereby he supports himself on his knees and bending elbows until his chest meets the ground after which he goes back to the starting point until he becomes so fatigued.

Sit-Up Test (Knees Bend)

Purpose: To test the power and the stamina of abdominal muscles. (Badawi, 2006)

Performance: Lie on your back, bend your knees and pull your hands in front of your chest and lift the torso to a degree of approximately 45 degrees until you are too tired.

Half Leg Test of Flexibility of Leg Muscles

Purpose: To record the stamina of the leg muscles. (Hassanein, 1995)

Performance: Stand with shoulders shoulder-width apart and feet flexed by having hands behind head and straightening knees to the same height as the chair up to exhaustion.

Cooper Test Cardiorespiratory Endurance (VO₂max)

Purpose: To test the efficacy of the cardiorespiratory system. (Hassanein, 2001)

Calculation: e- Maximum oxygen consumption (VO₂max) in mL/kg/min during Cooper test is calculated by the following equation: $VO_2 \text{ max} = \text{distance that was covered during running in meters } 504.9 / 44.73$

Exploratory Experiments

To verify that the instruments and measurements of the research would be valid, the researcher performed two pretests on the way to the actual research, to adapt the training program to the sample nature:

- First Exploratory Experiment (June 2, 2024): This consisted of people not in the sample to test the appropriateness of the anthropometric measurements, physical tests, and procedures to draw and analyze the blood samples.
- Second Experiment Exploratory (June 9, 2024): It involved five members of the sample, to establish the highest intensity of the exercises, the maximum length of the training process, the number of repetition, and rest intervals.

Pre-Tests

Pre-tests will be undertaken between June 15-17, 2024, and a timed schedule will be undertaken to reduce stress. Day 1 included: Anthropometric measurements include height, weight, body mass index (BMI), body density, fat percentage, and fat mass and lean body mass.

- Chemical measurements: glucose, insulin, testosterone and cortisol.

Day 2 Included:

Physical Examinations: cardiorespiratory endurance (Cooper test), abdominal muscle strength and endurance as well as arm leg strength.

Proposed Training Program

The proposed training program was designed on the basis of a number of scientific, physiological principles which are suitable to the sample and research objectives. The program was developed based on the knowledge that aquatic exercises can be used in enhancing the health and body composition of obese people. This is because there is less pressure of joints and the tissues that would be caused by weight since there is buoyancy besides the resistance that is natural due to water that makes the vital systems more efficient without putting excessive strain to the body. The principle of the gradual training intensity and volume was also followed, considering the level of fitness, age, and health feature of the participants. It was done with a view to choosing exercises that stimulate the cardiovascular and

respiratory systems and raise the metabolic efficiency to achieve positive influences on the desired chemical variables (glucose, insulin, testosterone, and cortisol).

The training took between 45 and 60 minutes and it was divided in the following way:

- General and specific warm-up: 1012 minutes.
- Basic exercises (main session): 3035 minutes, which is composed of strength, endurance, and mobility exercises. During the first weeks, bodyweight exercises are only done to improve the general conditioning and enhance balance and muscle control. Water weights, noodles of buoyancy and resistance boards were then brought in slowly to enhance resistance and safely increase the intensity of the workout. The resistance and the amount of the repetition were slowly and methodically modified to enhance metabolism and energy consumption to help in achieving better body composition and lower body fat percentage, which is in accordance with the program goals. The program was organized on a well equipped indoor swimming pool which was safe and provided privacy by the supervision of the sports training specialists. All the training sessions were registered and the performance measured to ensure that physiological, chemical and physical indicators progressed were well tracked. The researcher also recommended that the participants should follow moderate and balanced diet as a part of the program without the strict use of a diet in order to improve the consequences of the aquatic exercise.

Recommendations Included:

- Minimizing the calories that are consumed each day.
- Reducing intake of fat and sugar.
- Raising the consumption of water and vegetables.

Post-Tests

The tests were provided to be done after completion of the aquatic training program, which took place on September 21, 2024, to September 22, 2024. Reliability, objectivity, and accuracy were ensured using the same order and organization which was utilized in the pre-tests, under the supervision of the same research team and on the same environmental and spatial conditions.

Statistical Analysis

The SPSS statistical analysis program was applied to analyze the data and make scientific conclusions correctly. The analyses that were used included the Arithmetic mean, standard deviation, skewness coefficient, median, and t-test.

RESULTS DISCUSSION AND PRESENTATION

First: Presentation and Discussion of the Results of the Somatic Variables:

Table 3. Significance of the Differences Between the Pre- and Post-Tests for the Research Group in the Somatic Component Variable Under Investigation.

Significance	P-value	T-value	Difference between means	Post-selective ±SD	Post-selective ±SD	Pre-selective ±SD	Pre-medium	Variable
Significance	0.000	51.44	-8.40	2.40	101.30	2.21	109.70	Weight (kg)
Significance	0.000	54.72	-2.61	1.05	32.71	1.01	35.34	Body Mass Index
Significance	0.000	∞	+0.01	0.01	1.06	0.01	1.04	Density (g/cm ³)
Significance	0.000	232.53	6.49	3.17	19.21	8.99	25.70	(%) Fat Percentage
Significance	0.000	66.97	-6.54	3.05	19.44	3.34	25.98	Fat Mass (kg)
Significance	0.000	10.96	-1.86	4.29	81.86	4.46	83.72	Lean Weight

Anthropometric Variables: Discussion

The findings of the research indicated statistically significant differences between the pre- and post-test measures of all the anthropometric variables that were covered in the aerobic training program. There was a major reduction of weight in the participants whose average weight was 109.70 kg prior to the commencement of the program and 101.30 kg after the program. There was also a reduction in body mass index (BMI) that was 35.34 to 32.71 indicating a definite improvement in obesity amidst the participants. The body density was a bit higher (1.04 g/cm³) than it was (1.06 g/cm³), and the body fat percentage was reduced (25.70% to 19.21%), and fat mass reduced (25.98 kg to 19.44 kg). There was also a slight loss of lean weight which went down to 81.86 kg. The success of the aquatic exercise can be ascribed to these positive changes. The water body alleviates the weight stress on the joints and enables obese people to exercise in a safer and more sustainable way. At the same time, the natural opposition to movement in the water consumes more energy and burns fat. Moreover, the addition of cardiorespiratory activity to the resistance in water helps to achieve better

results between fat and muscle mass, and the body composition is considerably changed. As a result of this study, the findings are in agreement with the past literature. Benelli *et al.*, (2004) stated that aquatic exercise is a viable means of reducing fat and better body composition in overweight subjects and Gappmaier *et al.*, (2006) confirmed that body composition also improved after 12 weeks of regular aquatic exercises. Lee *et al.*, (2010) also demonstrated that aquatic aerobic exercise elevates the metabolic rate of exercising and improves the ratio between fat and muscles mass which reinforces the present results and validates the training program effectiveness of the training program employed in the research study. Also, these results were confirmed by Takeshima *et al.*, (2002) the resistance of the muscles in the aquatic environment during exercise does not strain the joints, which is essential in the case of overweight people where adherence to the program becomes achievable and tangible results are attained.

Discussion and Presentation of the Result of the Biochemical Variables

Table 4. significant of differences between experimental groups.

Significance	P-value	T-value	Difference between means	Post-selective ±SD	Post-selective ±SD	Pre-selective ±SD	Pre-medium	Variable
Significance	0.000	18.39	-21.2	2.15	99.8	5.72	121.0	Glucose (mg/dl)
Significance	0.000	8.91	-6.4	1.49	19.3	3.68	25.7	Insulin (µIU/ml)
Significance	0.000	-24.00	+24.0	19.44	301.5	20.17	277.5	Testosterone (ng/dl)
Significance	0.000	14.08	-4.9	1.06	18.7	1.65	23.6	Cortisol (µg/dl)

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Discussion and Presentation of the Result of the Biochemical Variables

Table 5. Significance of differences between pre- and post-measurements for the experimental group in the physical variables

Significance	P-value	T-value	Difference between means	Post-selective ±SD	Post-selective ±SD	Pre-selective ±SD	Pre-medium	Variable
Significance	0.000	84.12	151-	76.64	1507	78.90	1356	Cooper's (m)
Significance	0.000	14.7	7+	2.39	23.80	1.68	15.20	Abdominal endurance (repetitions)
Significance	0.000	4.52	4.2	2.31	14.30	1.90	10.5	Arm endurance
Significance	0.000	16.17	17.4	5.91	42.60	4.82	25.2	Diabolic (repetitions)
Significance	0.000	16.003	1.56	1.76	27.03	1.54	25.47	VO ₂ max (ml/kg/min)

Physical Variable Results: Discussion

Table (5) results indicate that there are statistically significant differences in all physical variables that were incorporated in the aerobic training program between the pre-test and the post-test. The Cooper test improved significantly in the subjects as the distance covered upon ending the program improved to 1507 meters as compared to 1356 meters before the program indicating an increase in cardiorespiratory endurance. This was assisted by the fact that the VO₂ max has risen (25.47 ml/kg/min) to 27.03 ml/kg/min, i.e. the cardiorespiratory system and heart and lung works more efficiently during aerobic activities (Bassett and Howley, 2000; Reilly *et al.*, 2009). There was also evident improvement in the arm and leg endurance tests wherein the repetitions in the arm endurance test went up to 14.3 as opposed to 10.5 and the leg endurance test went up to 42.6 compelling to 25.2 repetitions. This is

due to the fact that water offers multidirectional resistance that enhances strength and endurance of the muscles without straining the joints, a major benefit of water exercise by obese people (Becker, 2009; Chu and Pan, 2012).

Regarding muscle flexibility and endurance of lower limbs, there was a considerable improvement because of the constant movement in water. Buoyancy puts low pressure on the joints and makes exercises more effective and safe. This improvement indicates that the program is successful in improving the pelvic and leg muscle strength and endurance (Broman *et al.*, 2006; Gatti *et al.*, 2017). In the case of abdominal muscle endurance, there was a significant rise in repetitions which was 15.2 prior to the program and 23.8 at the end of the program. This is because of the factor of constant balancing in the course of aquatic exercise which

stimulates the core muscles and enhances core strength which is a critical factor in sustaining overall body performance and enhances motor control (Becker and Cole, 2011; Aquatic Exercise Association, 2010). These findings indicate that gradual and systematic aquatic aerobic exercise can be used to create a general effect on the physical capabilities, not only in terms of muscular endurance of various forces, but also cardiorespiratory fitness, which is consistent with the findings of other studies that showed that the use of aquatic exercise is effective in enhancing physical performance of overweight or obese individuals (Bassett and Howley, 2000; Becker, 2009; Chu and Pan, 2012; Broman *et al.*, 2006).

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Considering the results of the study conducted with the help of the proper statistical analysis, as well as basing on the research goals and hypotheses, the following conclusions can be made:

1. The 12-week aerobic training program led to considerable changes in all the anthropometric variables such as loss of weight, reduction in body mass index (BMI), body fat percentage, fat mass and increase in body density and lean body mass. It shows that there is a good change in body composition and ratio of muscle and fat mass.
2. Biochemical markers were also very promising, with reduced blood glucose and insulin levels, which means that the insulin sensitivity and blood sugar balance were improved. Also, testosterone and cortisol levels were raised and lowered respectively, positive hormonal reactions that indicated the beneficial effect that the physiological and psychological health of the participants had.
3. There were great changes in the physical abilities of the participants as they showed the muscle cardiorespiratory capacity (through Cooper test and VO₂ max) and endurance of the arm, the abdomen and lower extremities. This shows successful muscular and cardiovascular fitness to the requirements of the program.
4. The program was effective since it was a safe alternative among individuals with obesity especially in the aquatic environment where the program eased stress on the joints and enabled people to exercise flexibly and efficiently without injury and overexercising.
5. The slow increase in training loads and the diversity of exercises with the help of aquatic equipment had a particularly serious effect on the physiological adaptations. The progressive low to moderate to high intensity ensured gradual and safe improvement among the participants.

6. By following simple nutritional rules the program was more effective and the variables associated with obesity especially the lipid, blood sugar, and hormone levels improved. This explains why physical training should be used with dietary behavior.
7. The findings revealed that the aquatic training program was a holistic and integrated model, which integrated physiological, chemical, physical, and hormonal effects into an effective systematic model, and is a good alternative that can be applied in rehabilitation and physiotherapy programs.

Recommendations

- Aquatic aerobic exercises are prescribed as an efficient way of curing obesity due to the changes that they provide in physiological, chemical and physical aspects and because they are highly safe as opposed to their counterparts on land.
- Aquatic training programs must be made to progressively load training in the intensity, repetitions, and duration in the use of aquatic equipment including weights and gloves, to provide the intended muscular and functional changes.
- To obtain positive and sustainable outcomes in the loss of weight and enhancement of overall fitness, it is recommended to carry on with the programs at least 12 weeks with 3-4 sessions in a week.
- It is critical to include nutritional education as a part of the training programs by recommending the participants to prevent eating high-calorie foods and having a balanced diet to facilitate metabolism and decrease body fat. - Future field research on aquatic exercises is suggested in various groups of people such as the elderly, women and the chronically diseased like diabetes and hypertension to establish the effectiveness of programs on a larger scale
- It is good to incorporate the idea of aquatic activity in school curriculum and physical therapy programs, particularly in fitness and rehabilitation centers because it is a scientifically proven activity.
- Sports institutions and treatment centers should offer appropriate and safe aquatic environment and educate special staff to oversee aquatic exercises to attain program effectiveness and maximum safety of participants.

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