

The effect of Zumba training on body mass index and skeletal fitness In obese girls aged 15 to 18 years

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Introduction and research problem:

Zumba training is one of the modern trends in training methods. It reflects one of the results of the scientific renaissance in a purposeful training method, as it has spread widely and quickly throughout the world and achieved a qualitative leap in the sports field due to the elements of comprehensiveness and recreation it contains and relies on enjoyable movements and music tones. Which creates an atmosphere of comfort and enjoyment for the participants, in addition to its benefits in the field of developing physical and functional capabilities.

Technological progress is a characteristic of this era, in which the use of modern devices prevails for many hours. These electronic machines and computers have caused a reduction in the physical effort exerted. This has contributed to almost inactivity in performing daily jobs and tasks, as well as a decline in cultural awareness among everyone, especially in Adolescence emphasized the importance of practicing physical activity, which led to a reluctance to practice sports activities, and thus a decrease in physical efficiency and the spread of obesity, in addition to a decrease in the body's resistance to diseases (55 : 2).

Obesity is considered a condition in which the amount of fat in the body increases to the extent that it causes a negative impact on public health. There are different ways to determine normal weight, and then determine

obesity and its degrees, as the body mass index is considered one of the most important of these methods, as indicated by "Mohamed Al-Amin, Ahmed Hassan (2000) that the body mass index is a way to express body weight in light of its relationship to height and is calculated by dividing the weight in kilograms by the square of the height in meters (8:90).

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Skeletal fitness is one of the basic elements in carrying out activities, as the individual will not be able to do anything if he does not have skeletal fitness or what is called strength. Muscular strength is one of the basic components of health-related fitness, and interest in developing muscular strength does not come from our interest in sports activities. Only, but it comes as a result of practicing daily activities as a basis for activating, protecting and developing the movement of joints and muscles to their natural range (11:29).

The mass index and skeletal fitness are indicators of health fitness and factors that help the individual and are very necessary for practicing a normal, good daily life. Therefore, researchers and workers in the field of weight loss and health and physical fitness seek to find the best exercises and training methods that achieve their goals, and Zumba training is one of the types of aerobic exercise. It is one of the best training methods, because of its positive effect in burning some calories in the body and improving general health. Zumba aerobic exercises are a system of exercises designed to improve, supply and use oxygen in the blood. Many people participate in its exercises to increase their endurance and energy, and to maintain their appropriate weights and protect them. From diseases .

Through the work of one of the researchers as a physical education teacher in one of the secondary schools for girls in the Samalut

Educational Administration, and the work of the rest of the researchers in the field of sports training, they noticed the large number of obese girls in general and in the secondary stage in particular, which leads to these girls feeling an undesirable condition, whether in health or otherwise. Physical or psychological, and this is what prompted the researchers to design a program based on a set of Zumba exercises aimed at improving both (body mass index and skeletal fitness) for obese girls aged 15 to 18 years, Out of their belief that these exercises are among the most suitable sporting activities for girls, due to their varied, energetic and rapid movements, which can help reduce the percentage of bad cholesterol, triglycerides, and abdominal fat, in addition to improving muscle strength.

As far as the researchers know, through reviewing many studies and scientific references that were available in this regard, the researchers found that many studies did not pay attention to the effect of Zumba training for obese girls at this age stage. They also found a scarcity of research that dealt with the problems of reducing the mass index and improving the skeletal fitness of girls. Obese women and the effect of training using Latin dance movements on these variables. This is what called for the researchers to use a set of Latin dance movements through a Zumba training program and know its effect on improving both (body mass index and skeletal fitness) in obese girls aged 15 to 18 years.

Search goal:

This research aims to design a program using Zumba training and determine its effect on improving both (body mass index and skeletal fitness) among obese girls aged 15 to 18 years.

Research hypotheses:

In light of the research objective, the researchers assume the following:

1. There are statistically significant differences between the averages of the pre- and post-measurements for the experimental group in body mass index, in favor of the post-measurement.
2. There are statistically significant differences between the averages of the pre- and post-measurements of the experimental group in structural fitness, in favor of the post-measurement.

Terms related to the search:**ZUMBA:**

It is defined as "a form of physical performance that originated in Colombia and which relies on performing athletic movements through dancing to the tunes of Latin music such as (samba, salsa, reggaeton, merengue, hip-hop, cumbia, "belly dancing") and other music in which it appears. The cultures of different peoples, and it works to burn fat by changing the rhythm of performance from one tone to another to maintain the body at a permanent level of performance effectiveness (19:97).

Musculoskeletal Fitness:

It is defined as "a basic physical characteristic and the ability of a muscle or muscle groups to overcome one or more resistances (21:25), and this type is related to cardiorespiratory fitness, which provides the muscles with the oxygen energy necessary for muscle contraction" (20:204).

Research plan and procedures:**Research Methodology:**

The researchers used the experimental method as it is the appropriate method for the nature of this research, using an experimental design for one group using the (pre-post) measurement method due to its suitability to the nature of the research.

Research population and sample:

The research population was represented by overweight and obese girls whose body mass ranged from (27 to 37) kg at the girls' commercial secondary school "evening session" in the city of Samalout, Minya Governorate, in the academic year 2023/2024 AD, "first semester," which consisted of (108) girls. In light of this, the researchers selected a random sample of (20) girls, representing a percentage of 18.52% of the research population, as a basic sample to apply the research to. The following groups were excluded:

- The girls participating in the exploratory experiments were (20) girls.
- Girls who have physical disabilities or chronic diseases, numbering (16) girls.

- Girls who are not regularly attending school, numbering (28) girls.
- The number of girls who do not wish to participate in the research experiment is (14).

Table (1)

Description of the research sample

The original population		the basic research sample		the exploratory sample		the students who were excluded	
Number	Percentage%	Number	Percentage%	Number	Percentage%	Number	Percentage%
98	100	20	20.41	20	20.41	58	95.18

Distribution of the sample members in a moderate manner:

The researchers found a moderate distribution of the research sample members in light of the following variables: growth rates (age, height, weight), tests (mass index, skeletal fitness) under study, and Table (2) shows this.

Table (2)

The arithmetic mean, median, standard deviation, and skewness coefficient for growth rates and testing Body image and physical variables under investigation as a sample for research

Variables		measuring unit	Basic and exploratory research sample (n = 40)				Primary research sample (n = 20)			
			Average	Mediator	standard deviation	Torsion coefficient	Average	Mediator	standard deviation	Torsion coefficient
Growth rates	Age	year	17.16	17.30	0.37	1.16-	17.14	17.25	0.39	0.88-
	height	cm	1.61	1.62	0.06	0.33-	1.62	1.63	0.06	0.26-
	weight	kg	77.95	76.75	6.81	0.53	77.65	76.75	6.30	0.43
BMI		kg/m2	30.07	29.24	2.96	0.84	29.59	28.89	3.05	0.69
Structural fitness	Bend and extend the arms until fatigued	number	4.20	4.00	1.51	0.40	3.95	4.00	1.57	0.10-

It is clear from Table (2) that:

The values of the skewness coefficients for the growth rates and tests (mass index, skeletal fitness) under study for the basic and exploratory research sample are limited to (+3, -3), which indicates a moderate distribution of the basic and exploratory research sample in those variables.

Data collection tools:

- **Devices and tools:**

- Rhystameter device.
- Medicine ball weighing 1 kg.
- Flexibility Fund.
- Stop Watch.
- Measuring tape.
- Cones.

- **Body Mass Index test:**

The Body Mass Index (BMI) is used to evaluate body weight status. It is the result of dividing weight in kilograms by the square of height in meters. An individual is considered overweight when his weight is 10-20% higher than average. The weights corresponding to his height, and the individual is considered overweight or obese if the difference in weight exceeds 20%. To determine the body's position in terms of increase or decrease, it is calculated with the following mathematical equation:

$$\text{BMI} = \frac{\text{Weight in kilograms}}{\text{Length (meters)}^2}$$

The result obtained from this equation is classified according to the following:

- Less than 18.5 kg, the person is underweight.
- From 18.5 kg to 25 kg for a normal person.
- From 25 kg to 30 kg overweight person.
- More than 30 kg is an obese person (14).

- Structural fitness test:

- Test name: Bend and extend the arms until fatigue
- The aim of the test: to measure muscular endurance in the arms and shoulders.
- Tools used: This test does not require tools, as it is performed on flat ground.
- Description of the performance: He takes the prone position on the ground, so that the body is in an upright position and does not bend down or up. The experimenter repeats this performance as many times as possible without stopping until fatigue.
- Calculating grades: The experimenter continues to bend and extend the arms without resting or stopping, to record the largest possible number of bends and extensions of the arms until fatigue, and counts the number of times (5: 101).

The researchers calculated the scientific coefficients of validity and reliability of the test in the period from 10/12/2023 AD to the period 10/22/2023 AD as follows:

A - Honesty:

The validity of the skeletal fitness test under study was calculated through the validity of the two-sided comparison on a survey sample similar to the research community and from outside the basic research sample, numbering (20) twenty girls, and their scores were arranged in ascending order to determine the highest quartiles, numbering (5) girls, and the lowest quartiles, numbering (5). Girls, and the significance of the differences between them in these tests was calculated, and Table (3) shows the results.

Table (3)

Significance of the differences between the highest and lowest quartiles of the structural fitness test Under investigation by the nonbarometric Mann-Whitney method ($n_1 = n_2 = 5$)

Test	measuring unit	The highest quartile		Lower quartile		Average rank	U	W	z value	Probability of error
		M	Sd	M	Sd					
Bend and extend the arms until fatigued	number	5.20	0.45	2.60	1.14	8.00 3.00	0.00	15.00	2.70	0.007

It is clear from Table (3) that:

B- Constancy:

To calculate the stability of the skeletal fitness test under investigation, the researchers used the method of applying and re-application of the test on a sample of (20) twenty girls from outside the research sample who had the same specifications as the original sample, with a time interval of (3) three days between application and re-application, and Table (4) shows Correlation coefficients between application and reapplication.

Table (4)

Correlation coefficient between application and reapplication of the structural fitness test under investigation ($n = 20$)

Variables	measuring unit	Application		Re-application		Correlation coefficients
		M	Sd	M	Sd	
Bend and extend the arms until fatigued	number	4.45	1.43	4.90	1.33	0.85

Tabular (t) value at degree of freedom (18) and significance level (0.05) = 0.444

It is clear from Table (4) that:

The correlation coefficient for the structural fitness test was (0.85), which is a statistically significant correlation coefficient, which indicates the reliability of the test.

- Training program (Appendix 3):**- Objective of the program:**

The program aims to determine the extent of the effect of Zumba training on improving both (body mass index and skeletal fitness) in obese girls aged 15 to 18 years.

-Basics of developing the program:

After reviewing scientific references and previous studies, the researchers were able to extract the principles that were taken into account when designing and implementing the program, which are:

*** General foundations:**

- The program is appropriate for the age group involved in the research.
- Using some programs developed in the field for many studies.
- Availability of security and safety factors.
- Taking into account the principle of gradualness in the training load.
- Applying the principle of continuity in the exercise.
- Applying the principle of gradual training load.
- Determine the daily duties of the training unit.
- The contribution of all the contents of the training unit to achieving its objectives, including warm-up and cool-down.
- Determine the degrees of pregnancy, the method of its formation, and its objectives with precision.
- Taking into account the fluctuations throughout the program in stages, weeks, days and training units.
- **Special foundations:**
 - Determine the general objective of the training program.
 - Determine sub-objectives.
 - Choose the appropriate exercises for the program:

- Warm-up and stretching exercises.

- Special fitness exercises.

- Exercises similar to the nature of the technical performance of the skills.

- Exercises to calm down and relax

- Apply training load variables (intensity, repetitions, volume, rest periods) in accordance with the scientific foundations of sports training.
- Spreading the spirit of competition and community love among the research sample and encouraging them to perform well.
- Use appropriate training methods and means.
- Use evaluation methods to determine the progress of the program.
- Spreading the spirit of competition and community love among the research sample and encouraging them to perform well.
- Use evaluation methods to determine the progress of the program.

Steps to develop the program:

The following steps were followed to develop the training program:

- A reference survey of references, scientific research, and previous studies related to Zumba training to determine the most important components of physical fitness and body image for the girls in the research sample.
- Presenting the proposed training program to a group of experts to identify the validity of the program's content in what it was developed for, as well as determining the total time of the program, the time of the daily training unit, and the number of training times per week.

- Program design:

- The researchers reviewed scientific references and studies on sports training in general and Zumba training in particular, as well as scientific interviews with some experts specialized in this field (Appendix 1) to ensure the suitability of the program with the characteristics and attributes of the research sample.
- The researchers conducted pre-measurements of the (experimental) research sample to study the physical aspects of that sample.

- The researchers presented a survey form for the opinions of experts in sports training (Appendix 2) with the aim of:
- The total duration of program implementation.
- Number of weekly units.
- Training unit time.

3/4/5 The overall plan for the proposed training program:

- The period of the proposed training program is (8) weeks.
- Number of training times (3) days a week, with a daily training unit.

Table (5)
Time distribution of the program

Statement		Time distribution
Number of weeks		8weeks
Number of weekly units		Three weekly units
Training unit time		From (28: 60) minutes
Time of the training week		From (84: 180) minutes
The total time of the program		1014minutes
Unit parts	Warm up (5) minutes	120minutes
	Physical preparation (10) minutes	240minutes
	The main part (8:40) minutes	534minutes
	Closing (5) minutes	120minutes

The researchers divided the time allocated for the training unit into the warm-up (5 minutes), the physical preparation (10 minutes), the purpose of which is to prepare and warm up the various parts of the body and develop some elements of physical fitness, and the main part of (8:40) minutes, which contains Zumba exercises, which includes a number of exercises. The songs ranged between (2: 8) songs, gradually increasing the number of songs at a constant rate, two songs every two weeks, meaning that the first and second weeks (2) songs, the third and fourth weeks (4) songs, the fifth and sixth weeks (6) songs, and finally the seventh and eighth weeks. (8) songs, and a group of aerobic exercises were prepared that were proportionate and compatible with each song. One of the researchers (•) performed these exercises, and the girls who were the research sample performed them in light of the researcher's performance until the end of the song, and finally the concluding part, which takes (5) minutes of the training unit's time and purpose. It involves returning the body to its natural state by using relaxation exercises and simple, calm games, in which clothes are also changed. The program was applied to the sample under study after completing the school day "Sunday, Tuesday, Thursday" from twelve noon to one o'clock in the afternoon.

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Table (6)
Example of a training unit

1 : week		1 : unit	Sunday :Day	
minute 28 : Time				29/10/2023 :Date
Improving both (body mass index, skeletal fitness) :Goal				
Unit parts	Time	Content		
Introductory part	5minutes	Warm-up (running around the field – stretching exercises)		
Physical preparation	10 minutes	–Run in place for a minute –Throw a medicine ball as far as possible –Running in place 15 seconds –Pursuit race of 20–30 meters)Standing) alternating the rotation of the arms next to the body – (Standing) Exchanging torso twists Zigzags ran between the cones – –Run around a square with a side length of 3 meters Jump rope for 30 seconds --Throwing a tennis ball at a wall with one hand and receiving it with the other hand		
The main part	8minutes	Original Zumba song Return of the Earth Lions song		
The closing part	5 minutes	Cool down (light jogging around the field – relaxation exercises)		

: 7week 9		1 : unit	Thursday :Day	
minute 60 : Time				16/4/2023 :Date
Goal: Improve both (body mass index, skeletal fitness)				
Unit parts	Time	Content		
Introductory part	5minutes	Warm-up (running around the field – stretching exercises)		
Physical preparation	10 minutes	–Run in place for a minute –Throw a medicine ball as far as possible –Running in place 15 seconds –Pursuit race of 20–30 meters)Standing) alternating the rotation of the arms next to the body – (Standing) Exchanging torso twists Zigzags ran between the cones – –Run around a square with a side length of 3 meters Jump rope for 30 seconds --Throwing a tennis ball at a wall with one hand and receiving it with the other hand		
The main part	40 minutes	Original Zumba song Return of the Earth Lions song Makhasmaak song Wasa Wasa song Despacito song song Give the world away I loved you song song Your heart is a salty sea		
The closing part	5minutes	Cool down (light jogging around the field – relaxation exercises)		

Implementation steps for research:**-The exploratory study:**

The researchers conducted the exploratory study in the period from Sunday, 10/12/2023 AD to the period Tuesday, 10/22/2023 AD, on a sample of (20) girls from outside the research sample and who had the same specifications as the original sample from the basic research community, where physical and psychological measurements were conducted. Under research and the implementation of some Zumba exercises is under research.

*** Objectives of the exploratory study:**

- Identify the difficulties that may arise when implementing the measurements under research.
- Ensure the validity of the place to conduct the experiment and the validity of the tools used in the experiment.
- Adjusting the time distribution over the parts of the training unit 0
- Knowing the suitability of the selected exercises.

*** Results of the exploratory study:**

- Validity of the place where the experiment was conducted and the validity of the tools used in the experiment
- Training on measurements for the specific place to implement the program.
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Search application:**- Pre-measurement:**

The researchers conducted the pre-measurement of growth rates, physical tests, and the body image scale under study on Wednesday and Thursday, October 25 and 26, 2023 AD.

- Program application:

The researchers applied the program to the sample under study, where training took place at a rate of (3) units per week, the duration of the unit ranged between (28 and 60) minutes after the school day, and the application of the program took (8) eight weeks, with a total of (24) units

(Appendix 3) During the period from Sunday, 10/29/2023 AD, to Thursday, 12/21/2023 AD.

-post measurement:

After the end of the period specified for implementing the program, the researchers conducted post-measurements for the research group in each of (physical tests, body image scale) on Sunday and Monday, corresponding to 12/24/25/2023 AD.

The statistical method used:

In light of the aim and hypotheses of the research, the researchers used the following statistical methods:

“Arithmetic mean, median, standard deviation, skewness coefficient, correlation coefficient, non-parametric Mann-Whitney test, t-test, percentage rate of change.” The researchers accepted a significance level of (0.05). The researchers also used the Spss program to calculate some statistical coefficients.

Presentation, interpretation and discussion of the results:

Table (7)

The significance of the differences between the means of the pre- and post-measurements of the research sample in the body mass index test (n = 20)

Variables	measuring unit	Pre-measurement		post measurement		Average differences	Standard error	T value	Percentage rates of change%
		M	Sd	M	Sd				
BMI	kg/m2	29.59	3.05	27.09	2.60	2.50	0.20	12.50	8.25

Tabular T value at degree of freedom (19) and significance level (0.05) = 1.729

It is clear from Table (7) that:

There are statistically significant differences between the pre- and post-measurements of the research sample in the body mass index test and in the direction of the post-measurement, as the calculated (t) value is greater than the tabulated (t-) values at the significance level of 0.05, and the average percentage change for the post-pretest measurement for the sample was The research in this test (8.25%) and in the direction of the post-measurement indicates the positive effect of the program based on

Zumba exercises under research on the body fat percentage of the research sample.

The researchers attribute this result to the fact that Zumba training is one of the modern trends in training methods. It reflects one of the results of the scientific renaissance in a purposeful training method, because it contains elements of comprehensiveness and recreation and relies on enjoyable movements and music tones, which generates an atmosphere of comfort and enjoyment for the participants, in addition to its benefits in The field of physical and functional capabilities. Zumba training also provides a set of physical exercises, movements, and skills prepared and chosen on the basis of educational, physiological, movement, and aesthetic principles and is performed by a group of female students at the same time. The performance is linked to musical pieces. These group exercises are chosen in a specific and special way and are performed under the leadership of a person. He displays a model of the movements and supervises the performance. Then the group performs the movements together at the same time, aiming to lose weight and improve the physical and health levels of the participants.

Researchers also believe that the real role of Zumba training in combating obesity and reducing the percentage of body fat actually lies in preventing it in the long term, as the results of many researches and studies indicate that the low rate of physical activity among adolescents is one of the main factors predisposing to an increase in the percentage of obesity. Body fat. It seems that the total energy required to be expended during the week in order to maintain the body fat percentage does not increase is represented by aerobic physical activity, and one of the best of these activities is Zumba training.

This is consistent with what Donatelle Rebecca (2005) indicated that practicing Zumba exercises has a positive effect in burning some calories in the body and improving general health. Zumba aerobic training is a system of exercises designed to improve the supply and use of oxygen in the blood, and many people participate in it. People exercise to increase their endurance and energy and maintain their appropriate weights, and practicing Zumba regularly helps reduce the risk of heart disease (16:88).

This is confirmed by the results of the study "Baraa Al-Nawaisa" (2019) that practicing Zumba exercises helps in losing weight and the percentage of fat in the body, as it helps burn calories ranging between (500: 1000)

and may exceed 1000 calories per hour. This ensures the loss of unwanted weight, and Zumba training increases the rate of metabolism in the body, which also contributes to promoting weight loss (1:33).

Also, Zumba training, when combined with resistance exercises, has a positive effect on burning calories and benefits the health of blood vessels and the tone and harmony of the body (15:2).

This is also consistent with what Levers et al (2013) indicated that Zumba is one of the sports in which the individual exerts physical effort that depends on oxygen work, which contributes significantly to influencing body weight by burning fat and reducing its size (18: 82).

Also, one of the advantages of Zumba training is that the muscles are moved in a way that requires securing energy using the aerobic method, as these exercises will activate the organ that receives oxygen from the air, which is the lungs, as well as the organ that facilitates the transfer of oxygen from the lungs to the muscles, which is the heart and blood vessels. Therefore, practicing Zumba exercises moves the muscles at a moderate pace and rhythm, which is all that is necessary to activate and raise the efficiency of the functional capabilities of the lungs, heart, and blood vessels (16:65).

In this regard, Nemat Ahmed (2000) (10) indicates that the continuous work of the muscles requires a constant flow of glycogen to produce movement, and when the glycogen (which was present before the start of exercise) is depleted, the stored fat reserves provide the body with additional glucose until the exercise stops, and so on. Fat is burned, which leads to weight loss, and thus a decrease in the body mass index and a decrease in body measurements. This is confirmed by the results of Table (12), which indicated that the average percentage change for the post-pretest measurement for the research sample in the percentage of body fat (mass index) reached (8.25%).) And in the direction of the post-measurement, which indicates the positive effect of the program based on Zumba exercises under study on the body mass index of the research sample, and these results are consistent with the results of the study of: "El-Azazy" (2022) (17), "Malik Reda" (2021) (7), "Mohamed Salah El-Din, Mohamed Ziadeh, Nahla Al-Qawji" (2021) (9), "Salma Adam" (2020) (3) that Zumba training has a positive and direct effect on reducing the percentage of body fat among participants in performing Those exercises.

This fulfills the first hypothesis of the research, which states that “there are statistically significant differences between the averages of the pre- and post-measurements of the experimental group in body mass index, in favor of the post-measurement.”

Table (8)

The significance of the differences between the means of the pre- and post-measurements of the research sample in the skeletal fitness test (n = 20)

Variables	measuring unit	Pre-measurement		post measurement		Average differences	Standard error	T value	Percentage rates of change%
		M	Sd	M	Sd				
Structural fitness	number	3.95	1.57	5.70	1.30	1.75	0.12	14.58	25.18

Tabular T value at degree of freedom (19) and significance level (0.05) = 1.729

It is clear from Table (8) that:

There are statistically significant differences between the pre- and post-measurements of the research sample in the structural fitness test and in the direction of the post-measurement, as the calculated (t) value is greater than the tabulated (t-) values at the significance level of 0.05, and the average percentage change for the post-pretest measurement for the research sample was In this test (25.18%) and in the direction of the post-measurement, which indicates the positive effect of the program based on Zumba exercises under research on the skeletal fitness of the research sample.

The researchers attribute this result to the research sample's practice of the proposed program, which was built on comprehensive scientific foundations of the principles of sports training foundations and physiological principles, which reflected positively on skeletal fitness, as the program was distinguished by containing a group of Zumba exercises that followed scientific methods such as gradual progression and undulation in proportion to The girls were the research sample, which led to a reduction in the percentage of body fat and an increase in skeletal fitness. Modern aerobic exercises such as Zumba help to develop skeletal fitness and create coordination between parts of the body in general by performing different movements that the whole body performs within the

limits of its capabilities and capabilities. It is a group of Sports training that aims to improve physical fitness and includes music and dance movements in an exciting and joyful movement system. It is also light training in which participants enjoy high energy, enjoyment, and the desire to perform it daily. These training exercises are suitable for any level of physical fitness and any age stage.

The researchers also attribute this result to the diversity of Zumba exercises within the program with the variety of music (slow - fast), which had a positive effect on improving the elements of physical fitness in general and skeletal fitness in particular. The researchers also believe that the use of free exercises had a positive effect on the level of strength. And the muscular skin, because Zumba training, with its various movements that lead smoothly and continuously, helps to develop these elements and create coordination between parts of the body in general, by performing different movements performed by the whole body within the limits of its capabilities and capabilities, and harmony between the different parts of the body from the head to the feet. Zumba training is distinguished. It also contains rapid contractile movements for all parts of the body, which contributed to combining the components of muscular ability, such as strength and speed of motor contraction, because this type of training aims to move all the muscles of the body with the rhythm of the music, and thus all parts of the body participate, whether the feet, arms, abdomen, back, The legs, and this is consistent with what Wafa Attia and Heba Abu Zaid (2019) indicated that Zumba training had a high and sufficient impact on developing the individual's physical level more than walking, running, swimming, and group games, as the continuous movements of the entire body in At the same time, accompanied by music helps to continue exercising and raise physical efficiency levels (13: 335).

This is also consistent with what was indicated by the "American Society of Sports Medicine" (2011) (22) that Zumba exercises, which take a rhythmic nature and are practiced in moderation, contribute to improving physical fitness in addition to increasing the movement of calories, and that practicing Zumba exercises works to improve the level of physical performance. And controlling the psychological state of its practitioners, as Heidi Al-Bons (2013) (12) and Abeer Muhammad (2006) (4) agreed that

Zumba exercises have an effective effect on improving body shape, raising the level of physical fitness, as well as losing weight, and that performing Zumba exercises in a proper way Regular exercise leads to an increase in the level of physical fitness as a result of a decrease in the thickness of skin folds, a decrease in some body circumferences, and weight loss.

Inayat Faraj, Faten Al-Batal (2004) also add that musical accompaniment is considered a mandatory condition for performing individual and group exercises. Music is very important for training motor skills, as it helps to give them the desired feeling. It also has an emotional effect that pleases the soul, as it acts as an incentive and motivation towards... Repetitive movement is a means of liberation from nervous tension and helps the movement flow. It helps develop balance and control over parts of the body, which develops the sense of movement and delays the onset of fatigue. In addition, it gives participants in these exercises the opportunity to express their desires and feelings of movement (6:20).

This is what is indicated by the results of the same table, which showed that the average percentage change in the pre-post measurements for the research sample in the skeletal fitness test under study reached (25.18%) and in the direction of the post-measurement, which indicates the positive effect of the program based on Zumba training under study on fitness. The structure under investigation, and these results are consistent with the results of the studies of "Hanan Samir" (2017) (2) and "Heidi Al-Bons" (2013) (12) in that Zumba training has a positive and direct impact on the development of the physical variables of the participants in those training.

This fulfills the second hypothesis of the research, which states that "there are statistically significant differences between the averages of the pre-and post-measurements of the experimental group in structural fitness, in favor of the post-measurement."

Conclusions and recommendations:**Conclusions:**

In light of the research results, the researchers reached the following conclusions:

1. Zumba training had a positive effect on the body mass index, as the average percentage of change for this variable reached (8.25%).
2. Zumba training had a positive effect on skeletal fitness, as the average percentage of change for this variable reached (25.18%).

Recommendations:

In light of the results of the research, within the limits of its field and the sample on which it was conducted, and in accordance with the conclusions reached, the researchers recommend the following:

1. Follow the scientific method when choosing or designing Zumba exercises, taking into account their suitability to the nature, characteristics and needs of those who implement them, taking into account the principle of individual differences between them.
2. Generalizing the application of Zumba exercises at the level of obese girls in secondary school because of its positive effect on reducing the percentage of body fat and improving skeletal fitness (muscular strength).
3. Conduct similar studies that address the impact of Zumba training on other samples, such as the age group or the opposite gender.

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Summary of the research in Arabic

The effect of Zumba training on body mass index and skeletal fitness**In obese girls aged 15 to 18 years**

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- ** Prof. Dr. Muhammad Abdel Moneim Al-Shafi'i
- ***• Researcher / Amal Muhammad Fathi Muhammad Mounir

This research aims to design a program using Zumba training and determine its effect on improving both (body mass index and skeletal fitness) in obese girls aged 15 to 18 years. The researchers used the experimental method as it is the appropriate method for the nature of this research, using a group experimental design. One method of measurement (pre-post) due to its suitability to the nature of the research.

The research population was represented by overweight and obese girls whose body mass ranged from (27 to 37) kg at the Girls' Commercial Secondary School "evening session" in the city of Samalout, Minya Governorate, in the academic year 2023/2024 AD, "the first semester," which consisted of (108) girls. In light of this, the researchers selected a random sample of (20) girls, representing a percentage of 18.52% of the research population, as a basic sample to apply the research to. One of the most important tools used in the research was the mass index test and the skeletal fitness test.

The researchers applied the program to the sample under study, where the training took place at a rate of (3) units per week, the duration of the unit ranged between (28 and 60) minutes after the school day, and the application of the program took (8) eight weeks, with a total of (24) units in the period from Sunday Corresponding to 10/29/2023 AD until Thursday, 12/21/2023 AD.

One of the most important results was that Zumba training has a positive effect on both (mass index and skeletal fitness).

The researchers recommend the need to generalize the application of Zumba training at the level of obese girls in secondary school because of its positive effect on reducing the percentage of body fat and improving skeletal fitness (muscular strength).

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