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PENGARUH LATIHAN SENAM AEROBIK MENGGUNAKAN BEBERAPA ALAT TERHADAP PENCEGAHAN OBESITAS PENYEBAB DIABETES DAN PENGATURAN KADAR GLUKOSA DARAH PADA PRIA USIA 35-45 TAHUN

The effect of practicing aerobic exercises using multiple tools to prevent obesity that causes diabetes and regulate blood glucose levels in males aged 35-45 years

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ABSTRACT
The research problem is that diabetes has become one of the so-called diseases of our time and one of the most widespread chronic diseases in Iraq. According to estimates by Iraqi health professionals, diabetes has multiple causes, the most important of which is obesity, which causes diabetes. It is well known that losing weight is difficult for non-athletic individuals. Therefore, the researcher's goal was to develop aerobic exercises to prevent obesity and regulate blood sugar levels, and to determine the effectiveness of these exercises in losing weight, treating obesity, and regulating blood sugar levels. The research sample consisted of (10) males aged 35-45 years. The aerobic exercises developed by the researcher were applied to the sample for (6) weeks, at a rate of three training sessions per week. These exercises were characterized by continuity and gradual progression in intensity and type. The researcher reached the most important conclusions, the most important of which is that practicing aerobic exercises affects weight loss and regulates blood sugar levels for the research sample.

Keywords: Aerobic exercise, obesity, diabetes , blood glucose level.

Abstrak
Permasalahan penelitian ini adalah bahwa diabetes telah menjadi salah satu penyakit yang disebut-sebut sebagai penyakit zaman kita dan salah satu penyakit kronis yang paling tersebar luas di Irak. Menurut perkiraan para profesional kesehatan Irak, diabetes memiliki banyak penyebab, yang terpenting adalah obesitas, yang menyebabkan diabetes. Sudah diketahui bahwa menurunkan berat badan sulit bagi individu yang tidak atletis. Oleh karena itu, tujuan peneliti adalah mengembangkan latihan aerobik untuk mencegah obesitas dan mengatur kadar gula darah, dan untuk menentukan efektivitas latihan-latihan ini dalam menurunkan berat badan, mengobati obesitas, dan mengatur kadar gula darah. Sampel penelitian terdiri dari (10) pria berusia 35-45 tahun. Latihan aerobik yang dikembangkan oleh peneliti diterapkan pada sampel selama (6) minggu, dengan kecepatan tiga sesi latihan per minggu. Latihan-latihan ini ditandai dengan kontinuitas dan peningkatan bertahap dalam intensitas dan jenis. Peneliti mencapai kesimpulan yang paling penting, yang terpenting di antaranya adalah bahwa berlatih latihan aerobik memengaruhi penurunan berat badan dan mengatur kadar gula darah untuk sampel penelitian.

***Kata Kunci**: Latihan aerobik, obesitas, diabetes, kadar glukosa darah.*

Introduction

Exercising in general is an important part of the process of losing excess weight and regulating blood glucose levels. The most important of these is the use of aerobic exercises, which means “the ability to perform muscular effort at a moderate or less than maximum intensity for a period of time exceeding three minutes, with the ability of the circulatory and respiratory systems to supply the working muscles with oxygen” (Salama, 2008). In addition, “there are conditions for aerobic exercises when practicing them, perhaps the most important of which is not to increase the exercise time to (40) minutes and not to exceed the number of times of practice to (3) times per week so as not to lead to loss of muscle mass, with the necessity of diversifying the forms of exercise” (W. Y. Muhammad & Ali, 1986). “Diabetes is one of the most dangerous and widespread diseases in the world in our modern era as a result of the technological progress taking place at present, which has caused a lack of movement among the members of our societies, which has all led to the spread of many diseases, including diabetes, which is known today as the disease of lack of movement. It is not limited to a specific age group or to one gender or a specific economic or social level, which makes scientists and doctors all over the world interested in this disease and work to conduct studies that help diabetes patients to live and adapt to this disease and limit its serious complications, and also interested in various prevention methods to avoid this disease before it occurs" (Mujahid & Others, 2019). “Diabetes, like other chronic diseases in this era, can be prevented in an individual. Preventing or delaying the onset of diabetes can be done by any individual. Several studies have been conducted, and the target groups were pre-diabetics and obese people, who are more susceptible than others to developing this disease. Pre-diabetes can reduce the risk of it turning into diabetes and sometimes returning it to normal. If your blood sugar level is higher than normal but lower than the threshold for diabetes, you have prediabetes, and your blood sugar level should be monitored for one to two years” (Al-Qanawi, 2013). Given the spread of obesity in the countries of the region and in Iraq in particular, and according to the estimates of specialists in the Iraqi Ministry of Health, they stated that approximately 30-40% of males suffer from obesity and overweight, which leads to a decline in the general health of people aged 35-45 years and the spread of many chronic and dangerous diseases among them, including diabetes in its various types, especially type 2 diabetes and its resulting complications, including heart disease, high blood pressure, peripheral neuropathy, high lipids, and high blood sugar.

After the researcher reviewed many articles, sources, studies and statistics to get rid of these diseases or reduce their complications , including the study of (Shaimaa Fathi Awda) on aerobic exercises (Al-Tarfi, 2003). and the study of (Walid Atallah Issa and others) on sugar levels (Issa & Others, 2021). The study of (Seda et al) on type 2 diabetes (Syeda, 2023). so the researcher decided to practice aerobic exercises using multiple tools to prevent obesity that causes diabetes and regulate blood glucose levels in males aged (35-45) years.

Methods

The researcher used the experimental method by designing an experimental group with pre- and post-tests for the research variables to solve the problem of this study. The experimental method is one of the best and most appropriate methods "because it allows for direct and accurate observation, and it is the most efficient means of arriving at knowledge”(Abbas & Others, 2011).

Research sample:

“The objectives that the researcher sets for his research and the procedures he uses will determine the nature of the sample he will choose” (Khuraibat, 1988). The research sample was deliberately selected from individuals suffering from overweight (obesity) males aged 35-45 years. The researcher selected (12) individuals from the workers in the Amerli Youth and

Sports Forum . The researcher then distributed a special form to the sample, including information about their health status (type of diabetes, cholesterol level, high and low blood pressure, heart disease, medications taken, regular or irregular exercise, daily working hours). Based on the results of these forms, those suffering from some other diseases such as high blood pressure and smokers were excluded, so that the total number of sample members became (10) individuals.

The researcher used a variety of methods and tools to collect information about the research sample and conduct field tests and experiments (tests and measurements, personal interviews, support staff, information collection forms, sources and references, glucose measuring device, pricking device, electronic scale for measuring height and weight, floor ladder, training jump ropes, training indicators, training rings).

Nominating and preparing aerobic exercises for the research sample:

After reviewing many sources and references, conducting interviews with experts, and giving them the special form regarding nominating and selecting the appropriate exercises for the research sample, several exercises were selected that help reduce weight and regulate and reduce blood glucose levels.

Exploratory experiment:

"The exploratory experiment is considered a practical training for the researcher to identify the positives and negatives that he encounters while conducting the tests in order to avoid them" (Majeed, 1999),The researcher conducted a pilot experiment before starting the main experiment in order to control the measurement variables and identify the obstacles facing the researcher during the research period, the extent of individuals' acceptance of sports exercises, the availability of equipment and its suitability, and to know the ability of the support team to implement the program. Therefore, the experiment was conducted on 2025/6/20 at four o'clock in the afternoon on (5) people from the Youth and Sports Directorate employees.

Pre - tests:

Tests are one of the most important methods used in scientific research, as they collect the necessary information about sample members. On 2025/6/25 at 4:00 PM, a blood glucose (sugar) test was conducted in Jawad Laboratory, and the weight of all sample members was measured.

Main experiment:

The researcher conducted the main experiment on the research sample and applied the selected rehabilitation aerobic exercises within the training units for a period of six weeks starting from 2025/6/28 until 2025/8/6, with three training units per week, which were held in the grounds of the Amerli Youth and Sports Forum . The researcher used the principle of gradualism in giving these exercises , so the specifications of the sports program were as follows:

1- The program period is (6) training weeks, with (3 training units) per week .
2- Training days (Saturday, Monday and Wednesday) every week .
3- Total training units (18) training units.
4- Time of one training unit (35-45) minutes.
5- The researcher relied on the principle of gradual intensity, "which is to start with movements and exercises from easy to difficult, gradually" (Shaghati, 2011).
6- The researcher also created a special group for the sample, in which he published some medical advice for those suffering from obesity, and published some publications on the benefits of exercising and its effect on the body, and gave some advice on how to eat and what types of food cause obesity and diabetes.

First Week / First Training Unit (a model for all training units)

Unit	Exercises	intensity	Time of each	Repetitions	Rest between	Groups	Rest between	Total time

sections			exercise (Sec)		each repetition		each set (Sec)	(Min)
Preparatory Section	Regular walk ,canter walk, heel walk, regular trot, swing trot, touch trot, knee-to-knee trot, heel-to-hip trot, stretching exercises							10
Main Section	From a standing position, lie down with your legs fully bent and extended.	%60-50	15	3	10	2	30	3.5
	Place your arms extended in front of your chest from a standing position. Raise and lower your arms up and down.	%60-50	15	3	10	2	30	3.5
	From a standing position, rotate your torso to the sides.	%60-50	15	3	10	2	30	3.5
	From a standing position, raise your knees to hip level, with your arms moving in line with your legs.	%60-50	15	3	10	2	30	3.5
	From a standing position, raise both legs alternately upwards, while bending and extending the arms to the sides.	%60-50	15	3	10	2	30	3.5
	Jogging on the spot with arms raised high alternately	%60-50	15	3	10	2	30	3.5
	Jog on the spot with arms crossed in front of the body	%60-50	15	3	10	2	30	3.5
	Jog on the spot with arms bent and extended to the sides	%60-50	15	3	10	2	30	3.5
Final section	Flexibility ,relaxation and calming exercises with walking, inhaling and exhaling in order to return the pulse to its normal state and return the body to a							5

	state of stability							

Post-tests:

After completing the aerobic exercise, post-tests were conducted in the same location, time, and conditions as the pre-tests on August 7, 2025. These results were used to conduct appropriate statistical analyses.

Statistical methods:

The researcher used the SPSS statistical program to process the results between the pre- and post-tests and homogeneously sample the research. This included using laws (arithmetic mean, median, skewness coefficient, standard deviation, calculated value (t-test), error rate (significance level)).

Discussion

After using statistical processing of the test results, the data were as follows:

Table (1) Homogeneity of the research sample individuals

Variables	Unit of measurement	arithmetic mean	The mediator	standard deviation	Coefficient of skewness
the age	Year	39.60	39.50	1.89	0.13 -
Height	Cm	168.50	169.50	3.24	0.44 -
the weight	Kg	90,00	91.50	4.96	0.02

The table above shows that the arithmetic mean for ages still reaching centuries ago (39.60) and the median (39.50) and the elastic deviation (1.89) and the skewness coefficient reached (-0.13) and the mean for very long ages (168.50) and the median (169.50) and the elastic deviation (3.24) and the skewness coefficient reached (-0.44) and the arithmetic mean for the weight of light reached the search (90.00) and the median (91.50) and the elastic deviation (4.96) and the skewness coefficient reached (0.02) so all the above results indicated that the sample is expanded and multiple, enabling age, height and weight where the interpretation of the skewness trade-off terms between +1 and -1.

Table (2) shows the arithmetic means, standard deviations, and the calculated t-test value for the research variables.

Variables	Pre-test		Post-test		value of t–test	error rate (Sig)	significance
	AM	SD	AM	SD			
the weight	90.00	4.96	86.10	4.67	9.00	0.00	Significant
Non-fasting glucose level	112.20	5.24	99.20	6.14	5.05	0.001	Significant

From Table No. (2) ,it is clear to us that the arithmetic mean of the pre -test for weight reached (90.00) with a standard deviation of (4.96), while the arithmetic mean of the post-test for weight reached (86.10) with a standard deviation of (4.67), and the value of the differences between the pre- and post-tests represented by the calculated (t -test (value reached (9.00). The error rate represented by (sig) which reached (0.00) which is less than (0.05) , and the arithmetic mean of the pre-test for non-fasting glucose reached (112.20) with a standard deviation of (5.24). In contrast, the arithmetic mean of the post-test for non-fasting glucose reached (99.20) with a standard deviation of (6.14). The value of the differences between the tests The pre- and post-test represented by the calculated value of (t-test) reached

(5.05)and the error rate represented by (sig) reached (0.001) which is less than (0.05).

The results in Table No. (2) showed statistically significant differences between the pre-test and post-test in weight at the significance level (0.05). The calculated value of (t) reached (9.00) in favor of the post-test. The researcher attributes this to the practice of aerobic exercises that were applied to the research sample on scientific foundations and within training units, repetitions, and appropriate groups, and by using multiple and varied tools . For a period of six weeks, with three training units per week, and also due to the use of the principle of gradual difficulty and intensity in the exercises. It is characterized by low-medium intensity, which means the presence of oxygen to burn fat during physical exertion . Ahmed Nasr El-Din Sayed emphasized that "the intensity range of the training load for aerobic exercises should be between 50-80%" (Sayed, 2021).

Fatima Hashoush Aboud confirms that “the balance between incoming energy and expended energy greatly helps in losing weight by burning the calories that the research sample members take in through physical exercise, as energy is burned at the expense of the body’s stored fat weight, which leads to weight loss” (Aboud, 2013).

And (Wassan Saeed), quoting (Cooper), “mentions that there is a relationship between aerobic exercise and weight loss. The term aerobic exercise means being in the air and benefiting from oxygen. It is a form of effort when oxygen is necessary throughout the period of performing it. That is, these exercises in the body create needs that call for increasing oxygen consumption, and thus appropriate exchanges occur between the lungs, blood vessels, and heart” (Saeed, 2005).

The results also showed in Table No. (2) that there are statistically significant differences between the pre-test and post-test in the blood glucose level at the significance level (0.05). The calculated value of (t) reached (5.05) in favor of the post-test. The researcher attributes this to the practice of aerobic exercises that were applied to the research sample on scientific foundations and within training units, repetitions, and appropriate groups, and by using multiple and varied tools . For a period of six weeks, with three training units per week, and also due to the use of the principle of gradual difficulty and intensity in the exercises. It was characterized by low-medium intensity .

“Some researchers believe that exercise helps significantly in regulating blood sugar levels, reducing harmful low-density lipids, and increasing high-density lipids, which protect against heart disease and atherosclerosis, and reducing blood pressure. Most importantly, it increases the effectiveness of insulin. When exercising, the effect of insulin on muscle tissue improves, thus increasing the consumption of sugar in the blood. The effect of insulin on the liver also increases, and the rate of sugar release from it decreases” (Al-Mandlawi & Abdullah, 1989).

Samia Khalil Muhammad points out that "paying attention to physical activity means paying attention to health more than physical fitness. Programmed effort to increase physical activity provides the opportunity to engage in adequate and organized physical activity, which helps reduce risk factors for positive physiological changes and thus gain health, maintain weight, and avoid excessive obesity" (S. K. Muhammad, 2006).

Amal Hussein Al-Sayed also confirms that “practicing aerobic physical activity contributes to lowering blood sugar levels by increasing its use inside muscle cells to produce energy. Aerobic physical activities also contribute to improving insulin receptors in cells, which increases the chances of transporting glucose from the blood to muscle cells to be used in energy production. This leads to a reduction in the percentage of free glucose in the blood” (Mohamed, 2025).

Krukov pointed out, "Physical activity in its various forms, such as walking programs and other forms of exercise, helps prevent diabetes and control blood sugar levels. Exercise also eliminates the need for medical drugs. Changing a sedentary lifestyle to an active one reduces the risk factor for developing type 2 diabetes by up to 43%, through weight loss, lowering the

percentage of fat, and increasing physical activity. As for patients with type 1 diabetes, exercise is not sufficient to control blood sugar, but it improves the condition and avoids complications" (Al-Jabri & Others, 2019).

(Muhannad Hussein Al-Bishtawi) and (Malin SK and others) indicate that “there is an inverse relationship between practicing sports activities and contracting non-insulin-dependent diabetes, as well as the effect of practicing physical activity on preventing contracting diabetes through its effect on glucose tolerance” (Al-Bishtawi, 2004), (Malin & Others, 2013).

Conclusions

The researcher concluded from this study that practicing aerobic exercises using multiple tools according to a prepared program lowered blood sugar levels and led to weight loss in the research sample. It was also shown that aerobic exercises using low to moderate intensity tools improved the functional performance of the heart, circulatory, and respiratory systems. Therefore, the researcher recommends practicing the research exercises longer than the period allocated for this study to ensure better results. He also recommends educating and raising awareness about the importance of regular aerobic exercise and its health benefits. He also recommends conducting similar research to this study and other samples focusing on preventing obesity, which causes diabetes, and regulating blood sugar levels.

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