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The Effect of Cardio Exercises on Cholesterol, Low-Density Lipoproteins (LDL), and Body Mass Index in Women Aged 30–35 Years

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Abstract

The importance of the research was achieved through practicing **cardio exercises**, which work to modify **cholesterol levels** and **low-density lipids** in the body, in addition to reducing the **body mass index** in the research sample, represented by women aged 30-35 years. The **research problem** lies in the fact that high levels of cholesterol and low-density lipoproteins (**LDL**) in the blood are among the most prominent risk factors leading to cardiovascular diseases. This health problem is especially important for women, as they face hormonal changes associated with **aging** and **menopause**, which affect blood fat levels and increase the likelihood of fatty deposits accumulating in the arteries. Therefore, cardio exercises help **adjust cholesterol and low-density lipoprotein levels** in addition to **body mass index**, thus helping to avoid some diseases associated with these factors. The research aims to prepare a **cardio exercise program** that suits the **research sample's** capabilities and identifies its effect on cholesterol, low-density lipoproteins (LDL), and body mass index in the research sample. The researchers used the **single-group experimental method**. As for the research procedures, the researchers prepared a special list for each individual in the research sample, in which all the information required for the research results was recorded, with specific fields for name, age, weight, and height, in addition to a field for the (LDL) percentage. The researchers prepared a cardio exercise regimen that suited the research sample. The pre-tests were conducted on Thursday, 1/06/2023, which included measuring the cholesterol percentage, low-density lipoprotein (LDL), and body mass index (BMI) and recording them in the special list for each individual in the research sample, which was placed within the previously mentioned form. The research variables were measured. Then, the exercise regimen was applied for (12) weeks at a rate of three sessions per week, after which the post-tests were conducted under the same conditions as the pre-tests. On 30/08/2023, the measurements and tests for the research variables were conducted to obtain accurate results. As for the conclusions reached, using cardio exercises for women aged 30-35 years helped reduce cholesterol levels in the body. It also reduced the percentage of low-density lipoprotein (LDL) present in the body. The researchers recommended relying on cardio exercises to reduce cholesterol, low-density lipoprotein, and body mass index in the body. They also advised periodically monitoring cholesterol levels and low-density lipoprotein (LDL) percentages because their increase can lead to heart and arterial diseases, emphasizing their importance in maintaining health. and this achieves one of the sustainable development goals of the United Nations in Iraq which is (Good Health).

Keywords

Cardio exercises, cholesterol, low-density lipoprotein.

Introduction :

Cardiovascular diseases are among the most common causes of death worldwide. One of the

most prominent factors contributing to these diseases is high cholesterol levels, especially bad cholesterol (LDL). With the increasing awareness of the importance of prevention and heart health, the role of physical exercise, particularly cardio exercises, is emerging as an effective method to achieve this goal. There are several health benefits to practicing physical activities for weight loss. They help burn excess calories and thus promote weight loss, in addition to reducing blood sugar and bad cholesterol levels, raising good cholesterol levels, and decreasing blood fats (13). Ashley confirmed that cardio exercises are cardiovascular exercises that work to increase the heart rate for an extended period, thereby improving the function and efficiency of the heart and lungs and burning calories and body fat (2). Brisk walking, jogging, cycling, and other similar activities are considered aerobic exercises that help enhance heart and lung function. However, the impact of these exercises extends beyond simply improving physical fitness to include regulating cholesterol levels in the body. Many studies indicate that cardio exercises can reduce bad cholesterol (LDL) levels in the blood while simultaneously raising good cholesterol (HDL) levels. Al-Zuhairi also mentioned that low-density lipoproteins (LDL) contain about 40-50% of cholesterol, representing around two-thirds of the cholesterol present in the blood. They are formed in the liver, with the function of transporting cholesterol from the liver to cells and tissues (11). Manason et al., (1980) highlighted that the small size of the LDL molecule and the high concentration of cholesterol in the blood allow LDL molecules to penetrate the arteries, forming fatty deposits that are directly linked to the development of arterial blockages. Therefore, high LDL concentration levels in the blood are considered an indicator of heart disease progression (4).

Hence, the research problem arises from the fact that high levels of cholesterol and low-density lipoproteins (LDL) in the blood are among the

most prominent risk factors leading to cardiovascular diseases. This health issue is particularly significant for women, who experience hormonal changes related to aging and menopause, affecting blood lipid levels and increasing the likelihood of fatty deposits accumulating in the arteries. Therefore, cardio exercises help adjust cholesterol levels, low-density lipoproteins, and body mass index, thus potentially preventing diseases associated with these factors. The research aims to develop a cardio exercise program suitable for the capabilities of the research sample and examine its impact on cholesterol, low-density lipoproteins (LDL), and body mass index in the sample. As for the research hypothesis, there are statistically significant differences between the pre- and post-tests, favoring the post-test in terms of cholesterol percentage, low-density lipoproteins (LDL), and body mass index in women aged 30-35. Regarding the research scope, the human field involves a sample of women aged 30-35 years, totaling 10 participants.

Therefore, the importance of the research lies in practicing cardio exercises, which help adjust cholesterol and low-density lipoprotein (LDL) levels in the body, in addition to reducing body mass index (BMI) in the research sample, represented by women aged 30-35 years.

Method and Procedures:

The researchers used the single-group experimental method as it aligns well with the research problem. This method is effective for problem-solving and is best understood through the practical results it yields. The sample was intentionally selected from women, with an initial sample size of 14 participants. Only those meeting the sample selection criteria, aged 30-35 years, were included, and 4 participants were excluded after necessary examinations determined they did not meet the specific criteria for the research sample. Consequently, the research sample consisted of 10 participants. The researchers ensured homogeneity among the

sample individuals in terms of age, height, and weight. The chronological age of the participants was calculated to the nearest year, height to the

nearest centimeter, and weight to the nearest kilogram, as presented in Table No. (1).

Table .1 Characteristics research sample

Variables	Measurement unit	Arithmetic Mean	± Standard Deviation	Skewness Coefficient
Height	Cm	163,5	3,3	2,4 -
Wight	Kg	81,60	3,5	1,93 -
Chronological age	Year	31,72	1,79	1,17 -

Table No. (1) above shows that all variables in the research sample are homogeneous, including height, weight, and chronological age, because the skewness coefficient for each of height, weight, and chronological age reached (-2.4, -1.93, -1.17), which is less than +3, indicating the homogeneity of the research sample.

Measurement and procedures

The researchers prepared a special list for each individual in the research sample, in which all the information required for the research results is recorded, including fields for name, age, weight, and height. Additionally, there are specific fields for recording the body mass index (BMI), as well as a field for the cholesterol level and low-density lipoprotein (LDL) level for each individual in the sample, where pre-measurements are recorded, and a separate form for post-measurements. The researchers selected a set of cardio exercises to determine their effect on cholesterol, low-density lipoprotein, and body mass index. They evaluated the application of these tests and the differences observed after the designated period for implementing the cardio exercises, which demonstrates the tangible improvement resulting from these exercises prepared by the researchers. The measurements included cholesterol levels, low-density lipoprotein (LDL) levels, and the body mass index (BMI).

The researchers used devices and tools

Rest Meter to measure weight (kg) and height (cm)

Electronic calculator Stopwatch.

- Blood sample collection and storage tubes contain a substance called Vacuum tube edat that prevents blood from clotting.
- Ice Box to store blood samples until they are transferred to the laboratory.
- A set of sterile plastic syringes for single use to draw a blood sample (10 ml).
- Medical cotton - adhesive strips (plaster) - local antiseptic (Antis).
- American-made centrifuge

The researchers used devices and tools as follows:

Rest Meter to measure weight (kg) and height (cm)

Electronic calculator (Stopwatch)

- Vacuum tube blood sample collection and storage tubes containing EDTA to prevent blood clotting
- Ice Box to store blood samples until they are transferred to the laboratory
- A set of sterile plastic syringes for single use to draw a 10 ml blood sample
- Medical cotton, adhesive strips (plaster), and local antiseptic (Antis)
- American-made centrifuge

The pilot experiment was conducted on Sunday, 28/05/2023 with 4 participants from the research community, who were later excluded from the main experiment. This pilot study introduced the sample to the physical tests that would be used, along with the sequence of their performance, and

served as training for the work team. During the pilot, one training unit was applied, lasting over 30 minutes.

The purpose of the pilot experiment was to determine the time required for measurements, verify the validity and capabilities of the devices and tools used, evaluate the capabilities of the assistant work team, and identify potential obstacles for the researchers to avoid during the main experiment.

The pre-tests and measurements for the research sample were conducted in the sports hall of the Al-Sekek Club

The Body Mass Index (BMI) was calculated using a method known for its simplicity and effectiveness as an indicator (12). It is sometimes referred to as the Quetelet Index, named after the Belgian mathematician Adolphe Quetelet (15).

The BMI was determined using the formula:

$$\text{Body Mass Index (BMI)} = \text{Weight (kg)} / \text{Square Height (m)}^2$$

The measurement of Low-Density Lipoprotein (LDL) was conducted in a laboratory by drawing blood from the sample by a specialist, with strict adherence to a 12-hour fasting period (no food or drink) before the blood draw. This fasting was essential to control the studied variables and ensure accurate measurement of LDL

concentration in the blood prior to physical exertion. The physical tests for the study were conducted Thursday, 1/6/2023, and included measurements of cholesterol levels, LDL, and BMI. These values were recorded for each individual in the research sample and documented on the previously mentioned data form.

The researchers prepared a cardio exercise program requiring sessions of more than 30 minutes, designed to elevate heart rate and improve the research variables affected by weight gain. The program was implemented from 4/6/2023 to 30/8/2023 over a period of 12 weeks, with each week consisting of three sessions—totaling 36 sessions. Exercises were selected based on the abilities and potential of the research sample participants, ensuring a variety of exercises and appropriate standardization of physical loads in terms of load, intensity, and density.

The post-tests were conducted under the same conditions as the pre-tests on 30/8/2023 and included measuring cholesterol levels, low-density lipoprotein (LDL), and body mass index (BMI). These results were documented for each individual in the research sample at the end of the cardio program. Statistical analyses were performed using SPSS to carry out the required operations.

Results:

Table (2)

Variables	Measurement Unit	Pre-test		Post-test		Calculated (t) value	Statistical Significance
		AM	STD	AM	STD		
Total cholesterol	mg/dl	201,7	17,50	168	10,87	16.56	Significant
Low-density lipoprotein (LDL)	ml	131.5	9.43	109.3	5.02	17.06	Significant
Body Mass Index (BMI)	degree	31.65	1.06	29.35	1.71	6.47	Significant

Discussion:

It is clear from the above presentation and analysis of the results between the pre- and post-

tests regarding total cholesterol that it was positively affected by a decrease in its percentage. This is due to the use of cardio exercises that were

performed for a long time, continuously, and for a suitable duration for the research sample. As both Diane and Jay Smith mention, "during physical activity and over time, reliance on stored fats in adipose tissues increases to meet the body's energy needs, and the longer the duration of physical activity, the more fat the body uses" (10). The study also aligns with Ahmed's study, which he conducted on a group of males and females in an aerobic walking program for 30 minutes per day over 30 days, and concluded a decrease in cholesterol levels (1). This finding is further confirmed by both Al-Hayali and Krouse, who state that aerobic training characterized by load repetitions leads to a reduction in cholesterol (a decrease in the percentage of cholesterol in blood plasma) (8) (3). Hayat believes that "practicing physical exercise, especially aerobic exercise, leads to a decrease in the amount of cholesterol in the blood as a result of cholesterol oxidation" (9). According to the results, there was a clear decrease in low-density lipids (LDL), consistent with the study by Abu Al-Alaa and Ahmed, whose results indicate that practicing aerobic physical activities regularly, at moderate intensity, and for long periods works to reduce the percentage of low-density lipids (LDL) and that total cholesterol is distributed more appropriately when aerobic activities are practiced (6). Ahmed Tawfiq also notes that numerous studies show regular physical activity leads to a reduction in blood fat levels, thereby decreasing the likelihood of cholesterol and triacylglycerol deposits on artery walls, which obstructs blood flow, reducing the risk of atherosclerosis and blood clots (7). This finding aligns with Haskell et al. (2003), who indicated, "Practicing aerobic physical activity converts harmful LDL into HDL protein, leading to a reduction in heart disease risk" (5). Regarding the body mass index (BMI), the results showed a significant decrease, demonstrating the effectiveness of the exercises. This is consistent with the findings of Mohammed El-Sayed and Ashraf Nabeeh, who observed that aerobic

physical activities at moderate intensity and for extended periods work to reduce body fat percentage, decrease body weight, and consequently lower the body mass index (BMI) (14).

Conclusions :

After presenting the results, the researchers reached a set of conclusions:

- 1- Using cardio exercises for women aged 30-35 years helped reduce cholesterol levels in the body.
- 2- Cardio exercises for women aged 30-35 years had an effect in reducing low-density lipoprotein (LDL) levels in the body.
- 3- Cardio exercises played an effective role in reducing the body mass index of the research sample.

Recommendations:

- 1- It is recommended to rely on cardio exercises to reduce cholesterol, low-density lipoprotein (LDL), and body mass index.
- 2- It is important to periodically monitor cholesterol and LDL levels as their increase can lead to heart and artery diseases, highlighting their importance to overall health.
- 3- There is a necessity to follow modern scientific training methods and ensure continuous follow-up of trainees by health centres and fitness centres.

Author's declaration:

Conflicts of interest: None

We confirm that all tables and figures in this article are ours and written by the researchers themselves.

Ethical-Clearance: this manuscript approved by local ethical committee of physical education and sport sciences college for women on (July /2024)

Author's contributions:

All contributions of this study were done by the researchers (S.H. and I.F.) who get the main idea

and work on writing and concluding also with number of experts, the researchers themselves in Statistics, Khitam Mousa in revision, Nour Riadh in translating, Nasser Yasser in proofreading
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تأثير تمارينات الكارديو على الكوليسترول والبروتينات الدهنية منخفضة الكثافة LDL ومؤشر كتلة الجسم للنساء بأعمار (30 – 35) سنة

شهد هيثم شيت 1 ، اسراء فؤاد صالح 2

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اهمية البحث كانت من خلال ممارسة تمارين الكارديو التي تعمل على تعديل مستويات الكوليسترول والدهون المنخفضة الكثافة في الجسم بالإضافة الى خفض مؤشر الكتلة لدى عينة البحث المتمثلة بالنساء بأعمار 30-35 سنة وتكمن مشكلة البحث في ان ارتفاع مستويات الكوليسترول والدهون المنخفضة الكثافة LDL في الدم يعد من أبرز عوامل الخطر المؤدية لأمراض القلب والأوعية الدموية. تعتبر هذه المشكلة الصحية مهمة خاصة عند النساء، حيث أنهن يواجهن تغييرات هرمونية مرتبطة بالتقدم في العمر وانقطاع الطمث، مما يؤثر على مستويات الدهون في الدم ويزيد من احتمالية تراكم الترسبات الدهنية في الشرايين لذا تمارين الكارديو من التمارينات التي تساعد على تعديل مستوى الكوليسترول والدهون المنخفضة الكثافة بالإضافة الى مؤشر كتلة الجسم وبالتالي تجنب الإصابة ببعض الامراض المصاحبة لهذه العوامل ويهدف البحث الى إعداد برنامج تمارينات الكارديو يتلاءم مع قدرات عينة البحث والتعرف على تأثيره على الكوليسترول والبروتينات الدهنية منخفضة الكثافة LDL ومؤشر كتلة الجسم لدى عينة البحث استخدمت الباحثان المنهج التجريبي ذو المجموعة الواحدة اما إجراءات البحث حيث قامت الباحثتان بأعداد قائمة خاصة لكل فرد من افراد عينة البحث مثبت فيها كل المعلومات المطلوبة لنتائج البحث، اذ توجد حقول خاصة لتثبيت الاسم والعمر والوزن والطول بالإضافة حقل لنسبة LDL واعدت الباحثتان منهج تمارين الكارديو يلائم عينة البحث وتم اجراء الاختبارات القبلية بتاريخ 2023/6/1 يوم الخميس والمتضمنة قياس نسبة الكوليسترول والبروتين الدهني منخفض الكثافة LDL ومؤشر كتلة الجسم BMI وتثبيتها ضمن القائمة الخاصة لكل فرد من افراد عينة البحث ووضعها ضمن الاستمارة المذكورة سابقا وتم قياس متغيرات البحث ثم تم تطبيق المنهج لمدة (12) أسبوع بواقع ثلاث وحدات في الأسبوع وتم اجراء الاختبارات البعدية في نفس ظروف الاختبارات القبلية وبتاريخ 2023/8/30 تم اجراء القياسات والاختبارات الخاصة بمتغيرات البحث للحصول على النتائج الصحيحة اما الاستنتاجات التي توصل اليها هو استخدام تمارينات الكارديو للنساء بأعمار (35-30) سنة ساعدة على خفض نسبة الكوليسترول في الجسم.و كان له تأثير في تخفيض نسب البروتين الدهني منخفض الكثافة LDL الموجود في الجسم . واوصت الباحثتان من الأفضل الاعتماد على استخدام تمارين الكارديو لتقليل نسبة الكوليسترول والبروتين الدهني المنخفض الكثافة ومؤشر كتلة الجسم الموجودة في الجسم و التعرف بشكل دوري على نسبة الكوليسترول بالإضافة الى نسبة البروتين الدهني المنخفض الكثافة LDL كون ارتفاعهم ممكن ان يسبب امراض القلب والشرايين ولأهميتها في الجاني الصحي. وهذا ما يحقق احد اهداف التنمية المستدامة للامم المتحدة في العراق (الصحة الجيدة).

مستخلص البحث

تمارين الكارديو، الكوليسترول ، بروتينات الدهنية منخفضة الكثافة

الكلمات المفتاحية