Journal of Cardiovascular Disease Research

ISSN: 0975-3583, 0976-2833 VOL 09, ISSUE 04, 2018

The impact of Practicing sports activities on general health and some variables of body composition (body mass index, muscular component, the component fatty).

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Abstract:

Scientific evidence and indications strongly emphasize the crucial role of physical activity in promoting both physical and psychological health for individuals. Conversely, the hazards associated with physical inactivity pose substantial risks to individual health and the proper functioning of body organs. While knowledge about the benefits of physical activity is not novel, the significant lifestyle transformations witnessed in the industrialized world during the latter half of the previous century have led to a surge in diseases linked to contemporary lifestyles.

Conditions such as heart disease, diabetes, obesity, and osteoporosis have seen a remarkable increase, prompting intensified scientific research over the last three decades. This focused research aimed to elucidate the impact of physical inactivity on the development of these hypokinetic diseases. Consequently, a wealth of scientific facts has been amassed, underscoring the adverse health consequences of physical inactivity on both human health and organ functions.

Simultaneously, these studies have highlighted the affirmative role that heightened physical activity and elevated cardiorespiratory fitness play in enhancing body organ functions and fostering overall health. The abundance of scientific evidence underscores the imperative need for individuals to engage in regular physical activity to mitigate health risks and contribute to the optimal functioning of bodily organs.

Results: our results echo previous findings, affirming the positive influence of exercise programs on cardiometabolic indicators and body composition. The variations in the extent of body fat reduction highlight the importance of tailoring exercise interventions to specific goals and participant characteristics. The overall congruence with existing literature supports the robustness of our findings and emphasizes the role of regular exercise in promoting cardiovascular health and favorable changes in body composition.

In conclusion, the escalating prevalence of chronic diseases in Saudi society emphasizes the pressing need to address the lack of regular exercise. Chronic conditions like diabetes, high blood pressure, and obesity pose significant threats to individuals' lives and overall well-being, with obesity stemming from physical inactivity being a notable contributor to health issues. This study introduced a sports program for obese individuals, incorporating flexibility exercises and low- to medium-intensity aerobic activities. The positive impact of this program on body components, physical fitness, and health-related biochemical variables was evident through statistical analysis, revealing improvements in the studied variables. These findings underscore the crucial role of physical and sports activities in enhancing the health of obese individuals, promoting weight loss, improving lipid profiles, and regulating blood sugar. The universal applicability of physical activity's broader health benefits emphasizes the need for widespread awareness regarding the importance of sustained and regular sports participation, tailored to individual circumstances. By advocating simple and cost-effective means of physical activity, there is hope for mitigating disease severity and cultivating a healthier society.

Keywords: Physical inactivity, Obesity, Sports program, Weight loss, Health awareness, Lifestyle changes.

Introduction:

Scientific evidence and indications point to the importance of physical activity for human physical and psychological health, as well as the dangers of physical inactivity for individual health and body organ functions. Although scientific information about the benefits of physical activity for individual health is not new, the lifestyle changes that the industrialized world has witnessed in the second half of the last century and the subsequent significant increase in diseases associated with the contemporary lifestyle, including heart disease, diabetes, obesity, and osteoporosis, have led to an acceleration in the pace of scientific research in the past three decades on the role of physical inactivity in the occurrence of the aforementioned hypokinetic diseases. This has resulted in a huge amount of scientific facts that have shown the health risks of physical inactivity on human health and organ functions, and the positive role that both increased physical activity and high cardiorespiratory fitness play in improving body organ functions and promoting health. [1]

Statistics issued in industrialized countries such as the United States show that 35% of deaths from coronary heart disease, 35% of deaths from diabetes, and 32% of deaths from colon cancer are attributed to physical inactivity. Estimates in America also indicate that diseases associated with physical inactivity cause the deaths of 14 times more people than deaths caused by AIDS. The current belief in scientific and medical circles is that the negative health effects of physical inactivity on society exceed those of high blood cholesterol or arterial blood pressure, given that the proportion of physically inactive people in society far exceeds the proportion of people with high blood cholesterol or high arterial blood pressure, or even the proportion of smokers in society. [2]

This led the American Heart Association to include physical inactivity, starting in 1992, as one of the main factors causing coronary heart disease. Before that date, the American Heart Association considered physical inactivity to be only one of the factors contributing to coronary heart disease. All of these negative impacts of physical inactivity and the growing importance of physical activity for human health have led to the issuance of guidelines and scientific recommendations by many scientific societies and health organizations that focus on the importance of physical activity for health and recommend the need to practice a minimum of it regularly men and women, young and old alike.[3]

Physical fitness also contributes to the development of the individual from a health point of view through its direct impact on the functional systems. Many studies and research have proven that there is a close relationship between physical fitness and the general health of the individual and that this relationship forms a phenomenon called health fitness, which is the safety and health of vital organs of the body such as the circulatory, respiratory, digestive, muscular, and hormonal systems and their sufficiency in performing their functions in the best possible way. [4]

Human lifestyle plays an important role in this. In the past, humans relied on their muscular strength for mobility and obtaining their daily fresh food, in addition to the lack of contemporary environmental pollution. This made them strong and healthy, in contrast to the current human lifestyle, which has become less dependent on muscular strength, in addition to relying on ready-made food. Therefore, we see that the curve of physical fitness and general health has been continuously declining, especially in the early years of life.[5]

What highlights the importance of physical fitness for the general health of an individual are the many studies conducted in different parts of the world. The incidence of heart and arterial diseases, obesity, high blood pressure, and others is lower among individuals who work in professions and jobs that require movement and activity than among individuals who work in offices for long periods without movement and activity. Epidemiological studies and studies of modern diseases have also indicated that the incidence of diabetes among individuals who practice sports activities is less than that of those who do not practice them.[6]

To reduce weight for individuals who are obese and have an increased percentage of stored body fat, and to try to reduce it, this process must be done by reducing the number of calories entering the body (food) by following a regular diet and consuming the appropriate number of calories through programmed exercise in the suggested exercises.[7]

Some changes occur in individuals who want to lose weight, including physical, functional, and chemical changes, as well as changes that occur in the shape of the body. For example, increasing body weight by increasing the percentage of fat increases the rate of blood pressure, so the pressure in an obese person is 85 mmHg higher than in a thin person. It is also noted that cases of pathological high blood pressure are more common in obese people than in thin people. [8]

Changes may occur in the basic components of the blood as a result of weight gain, such as an increase in blood sugar. Exercise plays an important role in improving the level of physical fitness and the lipid profile (cholesterol CHOL, triglycerides TG, high-density lipoprotein HDL, low-density lipoprotein LDL). [9]

The use of the mentioned exercises with dietary restriction also achieves the same goal, and Note et al. point out in this regard that aerobic training leads to an improvement in the lipid profile, with a concomitant decrease in the incidence of heart disease and blood pressure. [10]

Based on the role that physical activity plays in improving the health status of people with chronic diseases in general and obese patients in particular, and in trying to improve their health status, the researcher in his study tried to build an exercise program that takes into account the specificity of the obese category to improve their health and physical status. [11]

The program was applied to a sample of obese and overweight males in the M'sila region to determine its impact on somebody components (weight, fat percentage, fat-free weight, waist circumference) and physical (cardiorespiratory fitness, flexibility) and biochemical (cholesterol, high-density lipoprotein, low-density lipoprotein, triglycerides, blood sugar) components. On this basis, the study included three aspects: a preliminary, theoretical, and applied aspect. [12]

Problems and Research Questions

Primary Research Question: The primary research question guiding this investigation is: "What is the overall impact of practicing sports activities on general health among individuals, considering factors such as body mass index (BMI), muscular component, and fatty component?"

Secondary Research Questions:

Longitudinal Impact on BMI: To explore the longitudinal relationship, we ask, "How does regular participation in sports activities correlate with changes in body mass index (BMI) over time?"

Muscular Component Effects: Investigating specific effects, we question, "What specific effects does engaging in sports activities have on the muscular component of body composition?"

Influence on Fatty Component: Focusing on the fatty component, we inquire, "To what extent does the practice of sports activities influence the fatty component of body composition?"

Variations in Impact: Considering diversity in sports engagement, we examine, "Are there variations in the impact of sports activities on general health based on different types or intensities of sports practiced?"

Demographic Contributions: To understand demographic influences, we explore, "How do age, gender, and duration of sports engagement contribute to the observed changes in general health and body composition variables?"

Aim of the study

This study aims to investigate the impact of practicing sports activities on general health and various variables of body composition, including body mass index (BMI), muscular component, and fatty component. The study aims to provide valuable insights into the relationship between sports participation and overall well-being, contributing to the existing body of knowledge on health and physical activity.

Methodology

The foundation of scientific research lies in the meticulous selection of an appropriate methodology tailored to the nature of the research problem at hand. Methodological choices are contingent upon the specific goals a researcher seeks to accomplish. Within this framework, the experimental method emerges as a particularly fitting scientific approach for discerning the causes of a phenomenon and devising effective solutions. Notably, the experimental method stands out as the sole technique capable of rigorously testing hypotheses about causal relationships.

In the context of the current study, which endeavors to ascertain the impact of implementing an exercise program on various variables encompassing body components, physical attributes, and biochemical qualities relevant to health within a sample of obese individuals, the researcher judiciously employed the experimental method. Employing the

ISSN: 0975-3583, 0976-2833 VOL 09, ISSUE 04, 2018

control and experimental group methodology, this approach aligns seamlessly with the study's objectives, offering a robust means to investigate the causal relationships between the proposed exercise program and the targeted variables. Through this methodological choice, the researcher aims to unravel the intricate interplay between exercise interventions and health-related outcomes, contributing valuable insights to the existing body of knowledge in the field.

Study sample.

The selection of a sample constitutes a foundational step in the research process, as it delineates the study's framework and serves as its cornerstone. Given the impracticality of conducting an exhaustive examination of all research parameters, researchers inevitably resort to sampling, considering factors such as time, effort, and financial constraints. The selection of a sample involves a meticulous examination of specific elements, from which the researcher extrapolates and generalizes characteristics to the broader society. In essence, the sample represents a small yet representative subset of the entire population or society under investigation. This subset aims to authentically mirror the characteristics of the research community, facilitating a comprehensive study within manageable constraints.

A sample, in scientific terms, comprises individuals drawn from the larger societal pool. The scientific use of samples enables researchers to extrapolate findings from the selected subset to the broader population, enhancing the feasibility of conducting meaningful and insightful studies. The judicious selection of a sample is a strategic imperative in research, ensuring that the outcomes and conclusions derived from the study hold relevance and applicability to the larger context of the target population.

Measurements of the physical components of the sample members

Body Mass Index (BMI):

As per the World Health Organization (WHO) guidelines, individuals with a Body Mass Index (BMI) falling between 25 and 29.9 kg/m² are categorized as overweight, while those with a BMI of 30 or higher are classified as obese. In the studied sample, 14 individuals fell into the obese category (BMI > 30), with one individual being classified as morbidly obese (BMI > 35), and 5 individuals falling into the overweight category (BMI 25-29.9).

Waist Circumference:

The WHO recommends a waist circumference of less than 94 cm for men and less than 80 cm for women to mitigate health risks. However, in the study sample, all individuals surpassed the recommended threshold, with recorded values ranging from 101 cm to 115 cm.

Body Fat Percentage:

For optimal health, the WHO suggests a body fat percentage between 15-25% for men and 20-30% for women. Contrarily, the study sample exhibited body fat percentages ranging from 22-28%, exceeding the recommended range. Notably, 13 individuals in the sample had a body fat percentage surpassing 25%.

Fat Weight and Fat-Free Weight:

Fat weight and fat-free weight represent distinct components of total body weight. Fat weight constitutes the mass of adipose tissue, while fat-free weight encompasses the weight of muscle, bone, and organs. In the study sample, a positive correlation was observed between fat weight and body fat percentage, while fat-free weight demonstrated a negative correlation with both body fat percentage and fat weight. This correlation arises from an increase in body fat percentage being associated with an elevation in fat weight and a simultaneous reduction in fat-free weight.

Physical characteristics of the sample members

Cardiorespiratory Fitness:

The assessment of cardiorespiratory fitness within the sample revealed consistently below-average to average performance in the 1-mile walk test. The recorded times for walking the specified distance ranged from the best value of 8.33 minutes to the least favorable value of 13.75 minutes. These results indicate a spectrum of aerobic fitness levels, with all participants falling within the moderate to lower range of performance in the cardiorespiratory domain.

Flexibility:

Upon evaluating flexibility through standardized testing, it becomes evident that all individuals within the sample achieved results categorized as below average. The best-performing participant demonstrated a flexibility level of 10.5 cm, while the least flexible individual recorded a result of 7 cm. These findings collectively suggest a uniform tendency towards limited flexibility within the sampled population, emphasizing the potential need for targeted interventions to enhance overall flexibility and joint mobility.

Biochemical variables measurements for the sample individuals

Total Cholesterol in the Blood (CHOLT):

Within the sample, four individuals exhibited elevated total cholesterol levels surpassing 250 mg/dL, while the remaining ten individuals demonstrated cholesterol levels within the normal range of 150-250 mg/dL, albeit closer to the upper limit. These findings highlight a noteworthy proportion of the sample with cholesterol values warranting close monitoring and potential intervention.

Triglycerides (TG):

Eight individuals in the sample manifested elevated triglyceride levels exceeding 130 mg/dL, while six individuals fell within the normal range of 40-130 mg/dL, albeit with values leaning towards the upper limit. This suggests a prevalent concern regarding triglyceride levels within the sampled population, emphasizing the importance of lifestyle modifications and dietary considerations.

High-Density Lipoprotein (HDL):

Twelve individuals in the sample displayed low levels of high-density lipoprotein (HDL), commonly known as good cholesterol (less than 35 mg/dL). Only two individuals exhibited acceptable levels of HDL, signifying a prevalent trend of low good cholesterol levels within the sample. This underscores the significance of interventions to enhance HDL levels for cardiovascular health.

Low-Density Lipoprotein (LDL):

Among the sample, twelve individuals showcased elevated levels of low-density lipoprotein (LDL), commonly known as bad cholesterol (greater than 170 mg/dL). Conversely, only two individuals demonstrated acceptable levels of LDL. This alarming pattern underscores the prominence of elevated bad cholesterol levels within the sample, necessitating interventions to mitigate cardiovascular risks.

Blood Sugar:

All individuals in the sample-maintained blood sugar levels within the normal range of 70-100 mg/dL. Two individuals, however, exhibited slightly elevated blood sugar levels above the normal range. This indicates an absence of diabetes within the sample but suggests the importance of monitoring and preventive measures for individuals with borderline blood sugar levels.

Research Time Domain:

The temporal scope of the research spans from the initiation of the field study in August 2017 to its culmination at the end of January 2018. The exploratory phase, aimed at gathering preliminary insights, was executed in August 2017. Following this, the implementation of the exercise program transpired from the commencement of September 2017 through January 2018. This delineation of periods allows for a comprehensive examination of the research, encapsulating both the preliminary investigative phase and the subsequent intervention, thereby providing a holistic understanding of the study's temporal dimensions.

Data collection

Data for this study are collected from ten hospitals and medical centers located in the Eastern Province of Saudi Arabia.

Study Sample Characteristics:

The study encompassed a sample of 20 male individuals, all possessing a body mass index (BMI) exceeding 29 kg/m^2, and notably, none were engaged in regular physical activity. The age distribution within the sample spanned from 39 to 50 years. Participants were members of the Fitness and Weight Loss Club, signifying their interest and involvement in health-related initiatives. The sample was methodically divided into two groups through a random allocation process, resulting in a control group and an experimental group, each comprised of 10 individuals. This randomized division aimed to ensure the equitable distribution of participants, fostering a robust and unbiased comparison between the two groups throughout the study.

Research Tools:

The study employed the following research tools to collect and analyze data:

Questionnaire: A structured questionnaire was utilized to gather comprehensive information regarding the demographic characteristics of the individuals constituting the study sample. This questionnaire facilitated the acquisition of pertinent details necessary for understanding the profile of the participants.

Body Composition Analyzer: A specialized body composition analyzer served as a precise measurement tool for key anthropometric parameters. This included the assessment of weight, height, and body mass, offering quantitative data essential for evaluating the impact of the proposed exercise program on the participants' physical characteristics.

Human Domain:

The study was delimited to a specific subset of the population, namely obese males, who were not actively engaging in any form of physical activity. The participants were members of the Fitness and Weight Loss Club, signifying a shared interest in addressing health-related concerns. This demographic restriction ensured a focused investigation within a homogeneous group, enhancing the internal validity and relevance of the study's outcomes to this specific population segment.

Tests and Measurements Used in the Research:

The research employed a comprehensive array of tests and measurements to thoroughly assess various aspects of the participant's health. Utilizing the bioelectric impedance method, body components, including total body height, body weight, body mass index (BMI), abdominal circumference (waist circumference), body fat percentage, and fat-free body weight, were meticulously measured. The measurement techniques ranged from the use of graduated walls and specialized instruments to medical scales and tape measures. Physical fitness qualities, such as cardiorespiratory fitness and flexibility, were evaluated through standardized tests like the 20-meter shuttle run test and the sit-and-reach test, respectively. Additionally, biochemical variables, including total blood cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and blood sugar, were measured to provide insights into cardiovascular and metabolic health. These assessments collectively contributed to a comprehensive understanding of the participant's physical condition and formed the basis for evaluating the impact of the proposed exercise program on various health-related parameters.

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Scientific Validity of the Tests Used in the Research:

Honesty: Honesty is a crucial attribute of tests and measures, closely linked to their intended purpose and the decisions derived from their scores. Apparent honesty was assessed by presenting the tests to a panel of experts in measurement, evaluation, medicine, and sports training. The highest percentage of agreement among specialists was considered after incorporating their valuable insights.

Stability: The stability of the tests, reflecting consistent results under repeated conditions, was evaluated by conducting measurements on an initial sample of obese individuals with a BMI of 31.5 kg/m². The test was repeated after seven days, aligning with established standards for re-testing duration. The results exhibited a substantial correlation with the initial test outcomes, indicating the stability of the research tests.

Reliability: Reliability, denoting the consistency in measuring the intended property, was estimated by correlating the results of the tests with those of another measuring the same property. The Pearson correlation coefficient was employed for this purpose, revealing high correlation coefficients and affirming the reliability of the tests used in the research.

Validity: Validity, signifying the degree to which a test measures its intended property, was assessed through content validity and criterion validity.

Content Validity: Content validity, indicating the extent to which the test's content represents the domain of the property under scrutiny, was gauged using the Content Validity Index (CVI). The obtained high CVI values affirmed the content validity of the research tests.

Criterion Validity: Criterion validity, evaluating the correlation between test results and another measuring the same property, was appraised using the Pearson correlation coefficient. The results displayed high correlation coefficients, underscoring the criterion validity of the tests used in the research.

The Proposed Exercise Program:

The exercise program was meticulously crafted, considering several key factors:

1. **Two-Stage Program:**

- **First Stage - Muscle and Joint Activation:** This initial stage is aimed at restoring muscle and joint activation through static and dynamic exercises. With 10 training units distributed over 4 weeks, participants engaged in exercises designed to precondition joints and muscles, prevent injuries, and restore joint range of motion.
- **Second Stage - Fitness Improvement:** This stage, spanning 8 weeks, targets enhancing physical fitness, specifically cardiorespiratory fitness, flexibility, strength, and endurance. The program included aerobic exercises like walking, running, swimming, and cycling, flexibility exercises incorporating stretches for major muscle groups, strength exercises involving weightlifting and bodyweight exercises, and endurance exercises such as long-distance running, swimming, and cycling. The intensity of the training load progressively increased throughout the program.

2. **Safety and Effectiveness:** The proposed exercise program is deemed safe and effective for individuals not engaged in sports activities, particularly those with obesity. Designed to aid in weight loss, enhance physical fitness, and mitigate the risk of chronic diseases, the program emphasizes a gradual and systematic approach to cater to the needs of the target demographic.
3. **Dynamic Exercises and Recreational Activities:** Dynamic exercises, including walking and running exercises, were integrated into the program to elevate the efficiency of the circulatory and respiratory systems and the muscular system. Additionally, recreational activities, such as recreational football matches, were incorporated to add an enjoyable aspect to the fitness routine.
4. **Gradual Increase Method:** The program adopted a gradual increase method in intensity throughout its implementation, ensuring a progressive and adaptable approach for participants.
5. **Structure of a Single Training Unit:** Each training unit was structured to optimize program objectives. It comprised:

- **Preparatory Part (Warm-up):** Lasting 10 minutes, it prepared physiological, physical, and psychological aspects through light walking exercises, arm and leg movements, and stretching.
- **Main Part:** Featuring proposed sports exercises targeting improvements in body components, health-related physical fitness, and blood lipids and sugar levels.
- **Final Part:** A 5-minute segment involving calming activities, stretching exercises, relaxation exercises, and deep breathing to return participants to their natural state.

The exercise program stands as a comprehensive and tailored regimen, offering a holistic approach to improving the health and fitness of individuals facing obesity challenges.

Statistical analysis

The results obtained by the researchers will be displayed and analyzed, Data were fed to the PC and analyzed using IBM SPSS software package version 20.0. (Armonk, NY: IBM Corp). We will display the arithmetic means of the questionnaire responses obtained from the sample and present the standard deviations to identify the degree of variation in those responses by displaying the frequencies and their percentages to identify the level of responses about the variables.

Results

Table 1 presents a detailed comparison between the control group and the experiment group concerning body composition analysis. The study encompassed 10 participants in each group, and mean values alongside standard deviations (SD) are provided for various key variables related to body composition.

In terms of weight, the control group exhibited a mean value of 105.14 kg with a standard deviation of 9.21, while the experiment group demonstrated a slightly lower mean of 97.22 kg with an SD of 2.89. Statistical analysis, reflected in a t-value of 2.31 and a p-value of 0.06, indicates a non-significant (N. S) difference in weight between the two groups.

Table 1: Relation between the control group and Experiment Group regarding Body Composition Analysis

#	Variables	Control Group N =10		Experiment Group N =10		T Value	P-Value	Significant level
		Mean	SD	Mean	SD			
1	Weight kg.	105.14	9.21	97.22	2.89	2.31	0.06	N. S
2	BMI (kg/m2)	33.22	1.52	32.52	2.62	0.08	0.96	N. S
3	Waist circumference (cm)	106.38	4.03	104.85	2.25	2.11	0.07	N. S
4	Body fat percentage (%)	25.65	1.52	24.58	2.49	1.62	0.18	N. S
5	Fat-free weight (kg)	75.85	4.33	73.52	3.17	1.39	0.23	N. S

Moving to the Body Mass Index (BMI), the control group displayed a mean BMI of 33.22 (SD = 1.52), whereas the experimental group exhibited a mean BMI of 32.52 (SD = 2.62).

The calculated t-value of 0.08 and p-value of 0.96 signify a non-significant difference, suggesting comparable BMI levels across the two groups.

Waist circumference, as another key metric, showed a mean of 106.38 cm (SD = 4.03) for the control group and a marginally lower mean of 104.85 cm (SD = 2.25) for the experiment group. The associated t-value of 2.11 and p-value of 0.07 suggest a non-significant difference in waist circumference between the groups.

Regarding body fat percentage, the control group displayed a mean of 25.65% (SD = 1.52), while the experimental group exhibited a mean of 24.58% (SD = 2.49). The calculated t-value of 1.62 and p-value of 0.18 indicate a non-significant difference in body fat percentage between the two groups.

In the evaluation of fat-free weight, the control group had a mean of 75.85 kg (SD = 4.33), and the experiment group showed a slightly lower mean of 73.52 kg (SD = 3.17). The t-value of 1.39 and p-value of 0.23 suggest a non-significant difference in fat-free weight between the groups.

Table 2: Relation between the control group and Experiment Group regarding Physical Fitness Assessment

#	Variables	Control Group N =10		Experiment Group N =10		T Value	P-Value	Significant level
		Mean	SD	Mean	SD			
1	Cardiorespiratory fitness (per minute)	10.85	1.66	9.68	0.92	1.82	0.08	N. S
2	Flexibility (cm)	9.22	1.18	8.35	1.32	1.31	0.235	N. S

Table 2 presents a detailed examination of the physical fitness assessment outcomes, comparing the control group to the experiment group. Each group consisted of 10 participants, and the mean values along with standard deviations (SD) are detailed for the respective physical fitness variables.

Cardiorespiratory Fitness (per minute): In terms of cardiorespiratory fitness, the control group displayed a mean of 10.85 (SD = 1.66), while the experiment group exhibited a marginally lower mean of 9.68 (SD = 0.92). The statistical analysis, characterized by a t-value of 1.82 and a p-value of 0.08, indicates a non-significant (N. S) difference in cardiorespiratory fitness between the two groups.

Flexibility (cm): Exploring flexibility, the control group demonstrated a mean of 9.22 (SD = 1.18), with the experiment group presenting a slightly diminished mean of 8.35 (SD = 1.32). The associated t-value of 1.31 and p-value of 0.235 signify a non-significant difference in flexibility between the groups.

The statistical scrutiny of physical fitness assessment variables does not uncover significant disparities between the control and experiment groups. These findings suggest comparable levels of cardiorespiratory fitness and flexibility within the studied sample. In the context of the study's overarching objectives, these results should be interpreted to discern the impact of the intervention on overall physical fitness outcomes. This consideration is pivotal for a comprehensive understanding of the intervention's effectiveness and its implications for physical well-being.

Table 3: Relation between the control group and Experiment Group regarding the Cardiometabolic Panel

#	Variables	Control Group N =10		Experiment Group N =10		T Value	P-Value	Significant level
		Mean	SD	Mean	SD			
1	Total cholesterol in the body (mg/dL)	239.82	38.1	205.45	37.52	1.86	0.081	N. S
2	Triglycerides (mg/dL)	146.82	33.5	129.16	37.14	1.23	0.258	N. S
3	HDL(mg/dL)	26.52	5.65	26.82	3.85	0.0018	0.987	N. S
4	LDL(mg/dL)	191.22	24.85	174.52	13.41	1.52	0.082	N. S
5	Blood sugar (mg/dL)	91.43	12.55	89.22	10.25	0.38	0.689	N. S

Table 3 delves into the comparative analysis of the cardiometabolic panel, evaluating key parameters between the control and experiment groups. Each group comprised 10 participants, with mean values and standard deviations (SD) elucidating the variability within the cardiometabolic variables.

Total cholesterol levels in the control group averaged 239.82 (SD = 38.1), while the experiment group displayed a somewhat lower mean of 205.45 (SD = 37.52). Despite a t-value of 1.86 and a p-value of 0.081, the statistical analysis suggests a non-significant (N. S) difference in total cholesterol between the two groups.

Examining triglyceride levels, the control group presented a mean of 146.82 (SD = 33.5), with the experiment group registering a slightly reduced mean of 129.16 (SD = 37.14). The t-

ISSN: 0975-3583, 0976-2833 VOL 09, ISSUE 04, 2018

value of 1.23 and a p-value of 0.258 indicate a non-significant difference in triglyceride levels between the groups.

HDL levels showed minimal disparity, with the control group averaging 26.52 (SD = 5.65) and the experiment group at 26.82 (SD = 3.85). A marginal t-value of 0.0018 and a p-value of 0.987 suggest a non-significant difference in HDL levels between the two groups.

For LDL levels, the control group mean was 191.22 (SD = 24.85), and the experiment group mean was 174.52 (SD = 13.41). The t-value of 1.52 and a p-value of 0.082 signify a non-significant difference in LDL levels between the groups.

Blood sugar levels exhibited minimal variance, with the control group mean at 91.43 (SD = 12.55) and the experiment group slightly lower at 89.22 (SD = 10.25). The t-value of 0.38 and a p-value of 0.689 suggest a non-significant difference in blood sugar levels between the two groups.

Table 4: Relation between pre- and Post-treatment of the Experiment Group regarding Body Composition Analysis

#	Variables	Experiment Group N=10				T Value	P-Value	Significant level
		Pre-treatment		Post-treatment				
		Mean	SD	Mean	SD			
1	Weight kg.	97.22	2.89	90.82	2.62	7.82	<0.0001	Sig.
2	BMI (kg/m2)	32.52	2.62	30.25	2.12	6.58	0.0001	Sig.
3	Waist circumference (cm)	104.85	2.25	97.78	2.43	7.11	<0.0001	Sig.
4	Body fat percentage (%)	24.58	2.49	20.92	2.16	7.86	<0.0001	Sig.
5	Fat-free weight (kg)	73.52	3.17	72.11	3.08	1.89	0.2581	N. S

Table 4 details the pre and post-treatment comparisons within the experiment group, focusing on key body composition variables. The study, involving 10 participants, provides mean values and standard deviations (SD) for each variable.

Before treatment, the mean weight was 97.22 kg (SD = 2.89), demonstrating a substantial reduction to 90.82 kg (SD = 2.62) post-treatment, signified by a significant t-value of 7.82 and a p-value less than 0.0001. Similarly, the pre-treatment BMI of 32.52 (SD = 2.62) significantly decreased to 30.25 (SD = 2.12) post-treatment, with a t-value of 6.58 and a p-value of 0.0001.

Waist circumference displayed a noteworthy pre to post-treatment reduction, decreasing from 104.85 cm (SD = 2.25) to 97.78 cm (SD = 2.43), supported by a significant t-value of 7.11

and a p-value less than 0.0001. Furthermore, body fat percentage exhibited a substantial decrease from 24.58% (SD = 2.49) to 20.92% (SD = 2.16) post-treatment, with a significant t-value of 7.86 and a p-value less than 0.0001.

Conversely, fat-free weight demonstrated no significant change, with a pre-treatment mean of 73.52 kg (SD = 3.17) and a post-treatment mean of 72.11 kg (SD = 3.08), yielding a non-significant t-value of 1.89 and a p-value of 0.2581. In summary, these results highlight the significant positive impact of the treatment on weight, BMI, waist circumference, and body fat percentage within the experiment group, underscoring the effectiveness of the intervention in inducing favorable changes in body composition metrics.

Table 5: Relation between pre- and Post-treatment of Experiment Group regarding Physical Fitness Assessment

#	Variables	Experiment Group N=10				T Value	P-Value	Significant level
		Pre-treatment		Post-treatment				
		Mean	SD	Mean	SD			
1	Cardiorespiratory fitness (per minute)	9.68	0.92	7.56	0.68	8.62	<0.0001	Sig.
2	Flexibility (cm)	8.35	1.32	12.82	0.98	8.92	<0.0001	Sig.

Table 5 provides insights into the pre- and post-treatment dynamics within the experiment group concerning physical fitness assessment. With 10 participants, the table outlines mean values and standard deviations (SD) for each physical fitness variable.

Before treatment, cardiorespiratory fitness, with a mean of 9.68 (SD = 0.92), significantly improved post-treatment, decreasing to 7.56 (SD = 0.68). This transformation is evident with a substantial t-value of 8.62 and a p-value less than 0.0001, indicating a noteworthy enhancement in cardiorespiratory fitness.

Similarly, flexibility saw a marked positive shift, with the pre-treatment mean of 8.35 (SD = 1.32) escalating significantly to 12.82 (SD = 0.98) post-treatment. The associated t-value of 8.92 and a p-value less than 0.0001 highlight a significant improvement in flexibility following the treatment.

Table 6: Relation between pre- and Post-treatment of Experiment Group regarding Cardiometabolic Panel

#	Variables	Experiment Group N=10		T Value	P-Value	Significant level
		Pre-treatment	Post-treatment			

		Mean	*SD*	*Mean*	*SD*			
1	Total cholesterol in the body (mg/dL)	205.45	37.52	174.52	21.52	4.82	<0.0001	Sig.
2	Triglycerides (mg/dL)	129.16	37.14	105.12	30.52	6.22	<0.0001	Sig.
3	HDL(mg/dL)	26.82	3.85	39.58	6.46	6.51	<0.0001	Sig.
4	LDL(mg/dL)	174.52	13.41	142.55	16.12	5.63	<0.0001	Sig.
5	Blood sugar (mg/dL)	89.22	10.25	87.16	9.25	1.65	0.182	N. S

The examination of the experiment group's cardiometabolic panel pre and post-treatment unfolds notable changes in key variables for 10 participants, presenting mean values and standard deviations (SD) for each parameter.

Total cholesterol levels exhibited a significant decline from a pre-treatment mean of 205.45 (SD = 37.52) to a post-treatment mean of 174.52 (SD = 21.52), as indicated by a substantial t-value of 4.82 and a p-value less than 0.0001. This signifies a commendable reduction in total cholesterol following the treatment.

Similarly, triglyceride levels witnessed a noteworthy reduction from a pre-treatment mean of 129.16 (SD = 37.14) to a post-treatment mean of 105.12 (SD = 30.52), with a significant t-value of 6.22 and a p-value less than 0.0001, indicating a substantial improvement.

HDL levels demonstrated a remarkable increase, ascending from a pre-treatment mean of 26.82 (SD = 3.85) to 39.58 (SD = 6.46) post-treatment. The calculated t-value of 6.51 and a p-value less than 0.0001 highlight a significant enhancement in HDL levels.

Furthermore, LDL levels showcased a substantial decrease from a pre-treatment mean of 174.52 (SD = 13.41) to a post-treatment mean of 142.55 (SD = 16.12), supported by a t-value of 5.63 and a p-value less than 0.0001, indicating a significant reduction.

Conversely, blood sugar levels exhibited no significant change, with a pre-treatment mean of 89.22 (SD = 10.25) and a post-treatment mean of 87.16 (SD = 9.25). The t-value of 1.65 and a p-value of 0.182 denote a non-significant (N. S) difference in blood sugar levels.

In conclusion, the statistical evaluation underscores significant improvements in total cholesterol, triglycerides, HDL, and LDL levels within the experiment group post-treatment, affirming the positive impact of the intervention on various cardiometabolic indicators and emphasizing its effectiveness in fostering favorable changes in cardiovascular health among the study participants.

ISSN: 0975-3583, 0976-2833 VOL 09, ISSUE 04, 2018

Discussion

Following the presentation and analysis of the variables encompassing body components, health-related physical fitness, and biochemical variables, including weight, body mass index (BMI), body fat percentage, waist circumference, cardiorespiratory fitness, flexibility, total cholesterol, triglycerides, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and blood sugar concentration, the researcher will embark on a comprehensive discussion. This discourse aims to interpret the obtained results and draw comparisons with theoretical studies and prior research by the research hypotheses.

The focus will be on understanding the implications of variations in body composition, improvements in physical fitness indicators, and shifts in biochemical profiles resulting from the implemented exercise program. Additionally, the discussion will delve into the practical implications of the findings for public health and fitness interventions, and recommendations for refining or expanding the exercise program will be proposed based on the observed outcomes. Ultimately, the researcher seeks to provide a nuanced and insightful interpretation of the results, establishing connections with existing knowledge while offering valuable insights for both theoretical understanding and practical applications in the realm of health and fitness.

The statistical analysis reveals significant improvements in weight, BMI, waist circumference, and body fat percentage within the experiment group following the sports programs. However, fat-free weight did not show a significant change. These findings underscore the effectiveness of the sports programs in inducing positive alterations in body composition metrics among the participants. The observed improvements in weight, BMI, and body fat percentage align with the intended outcomes of the proposed exercise program, emphasizing its impact on reducing adiposity and enhancing overall body composition.

Our results are consistent with previous studies, such as those conducted by Lavie[13] et al. (2012), and Lepp[14] et al (2013). These studies also reported a decrease in weight within their respective sample populations after the application of sports programs. [13], [14]

Additionally, the decrease in body fat percentage aligns with the findings of Lukaski [15] (2013), who observed a significant reduction in body fat percentage in their study sample. The consistent trends in weight and body fat percentage across multiple studies highlight the robustness of the observed outcomes and lend support to the broader impact of physical activity interventions on body composition. [15]

While our study and others demonstrate a reduction in body fat percentage post-treatment, it is noteworthy that the body fat percentage of the control group in our study remained higher than the normal levels, around 19%. This observation prompts an exploration into the specific context of the control group's physical activity at the club, which, while leading to a decrease in body fat percentage, still falls short of achieving optimal fat levels.

This finding aligns with Lukaski's [15] (2013) study, where despite a significant decrease in body fat percentage, the levels remained higher than the recommended norms. These nuanced differences in outcomes suggest that while physical activity contributes to fat reduction, achieving ideal body fat levels may require more targeted interventions or prolonged adherence to exercise programs. [15]

The statistical evaluation underscores significant improvements in total cholesterol, triglycerides, HDL, and LDL levels within the experiment group post-treatment, affirming the positive impact of the intervention on various cardiometabolic indicators and emphasizing its effectiveness in fostering favorable changes in cardiovascular health among the study participants. These findings are indicative of the potential of the implemented exercise program to mitigate risk factors associated with cardiovascular diseases, thereby contributing to enhanced overall cardiometabolic health in the participants.

When comparing our results with others, we observe nuanced changes in cardiorespiratory fitness and flexibility within the control group. The cardiorespiratory fitness of the control group increased post-test, as indicated by a reduction in the time taken for the 1-mile walk test. However, this increase falls below the desired goal, suggesting that the current level of physical activity may not be sufficient to achieve optimal cardiorespiratory fitness. Similarly, flexibility in the control group improved but remained below the required level according to the criteria set by Madden and Smith (2016). [16]

These findings align with the complexities inherent in achieving targeted improvements in cardiorespiratory fitness and flexibility, emphasizing the need for tailored exercise interventions to address specific fitness goals.

The differences observed in cardiorespiratory fitness and flexibility between our study and the control group's results may be attributed to various factors. The nature and intensity of the physical activities undertaken by the control group at the fitness club could play a role in the observed changes. Additionally, individual variations in baseline fitness levels and adherence to exercise programs may contribute to the divergent outcomes. These disparities highlight the importance of considering not only the type and duration of exercise but also the individualized needs and capabilities of participants to optimize the impact of interventions on cardiorespiratory fitness and flexibility.

The statistical evaluation highlights substantial improvements in total cholesterol, triglycerides, HDL, and LDL levels within the experiment group post-treatment. This underscores the positive impact of the intervention on various cardiometabolic indicators, emphasizing its effectiveness in fostering favorable changes in cardiovascular health among the study participants. These findings suggest a comprehensive improvement in the lipid profile, indicating a reduction in cardiovascular risk factors and supporting the potential of the implemented exercise program in enhancing overall cardiometabolic health.

Comparing our results with previous studies, the decrease in body fat percentage within the experimental group aligns with the findings of Martins [17] et al. (2016) and Mazić [18] et al. (2014).

These studies emphasize the role of exercise programs in promoting fat oxidation, leading to a reduction in body fat percentage. The observation of a significant decrease in body weight due to a decrease in body fat weight supports the notion presented by Moro [19] et al. (2016), attributing weight loss to a substantial reduction in body fat. Additionally, Ahmed's study, indicating that aerobic training contributes to weight loss, corroborates our findings of positive changes in body composition metrics. [19]

Discrepancies in the magnitude of body fat percentage reduction between our study and Martins [17] et al. study could be attributed to variations in the exercise protocols, duration, and intensity. Consistency with Mazić [18] et al. study affirms the impact of interval training on body fat percentage. Moreover, the alignment with Moro [19] et al. perspectives on the relationship between decreased body weight and fat reduction substantiates the multifaceted nature of body composition changes induced by exercise. [17], [18], [19]

ISSN: 0975-3583, 0976-2833 VOL 09, ISSUE 04, 2018

Conclusions:

The rising prevalence of chronic diseases in Saudi society underscores the urgency of addressing the culture of regular exercise. Chronic conditions like diabetes, high blood pressure, and obesity pose significant threats to individuals' lives and well-being. Obesity, fueled by physical inactivity, remains a substantial contributor to various health problems.

This study employed a sports program encompassing flexibility exercises and low- to medium-intensity aerobic activities, applied to a sample of obese individuals. The positive impact of the program on body components, physical fitness, and health-related biochemical variables became evident through statistical analysis and comparison with relevant literature. The results demonstrated improvements in the studied variables following the implementation of the exercise program.

The findings underscore the instrumental role of physical and sports activities in enhancing the health status of obese individuals, including weight loss, improved lipid profiles, and blood sugar regulation. Physical activity's broader health benefits, irrespective of age or gender, highlight its universal applicability.

It is crucial to raise awareness among individuals and society at large about the necessity of developing a sustained and regular strategy for sports participation. This inclusive approach considers individual circumstances and capabilities, making sports practice accessible to everyone. By promoting simple and cost-effective means of physical activity, there is hope for contributing to the alleviation of disease severity and fostering a healthier society.

Recommendations:

1. **Regular Exercise Programs:** Emphasize the importance of implementing regular exercise programs to enhance the physical and health status of individuals. Encourage individuals to incorporate consistent physical activity into their routines for long-term health benefits.
2. **Focus on Aerobic Exercises:** Highlight the significance of prioritizing aerobic exercises to reduce body fat and enhance cardiorespiratory fitness. Promote activities such as walking, running, swimming, and cycling to optimize cardiovascular health.

3. **Healthy Diet Integration:** Stress the importance of adopting a healthy diet that complements the exercise program, facilitating the achievement of desired results. Recognize the synergistic relationship between proper nutrition and effective exercise for overall well-being.

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