

The impact of callanetics exercises on some biomotor skills and physical characteristics of women with osteoporosis aged 45–55 years

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ABSTRACT

The purpose of this study was to demonstrate the value of callanetics exercises in enhancing some aspects of the health fitness of women with osteoporosis and to determine how callanetics exercises affect elderly women with osteoporosis in terms of enhancing certain aspects of health fitness. The sample included women with osteoporosis of the Department of Physiotherapy at Baghdad Hospital, aged 45–55 years, during the period from 1/3/2022 to 9/8/2022. The callanetics exercises applied produced a decrease in the percentage of fat, with a decline in the values of hip and thigh circumferences.

KEYWORDS

Callanetics exercises; Biomotor abilities; Body composition; Osteoporosis

1. INTRODUCTION

Connective tissue forms the bones which are a living and dynamic structure made up of fat cells, blood vessels, and other components. The skeleton's bones serve as a pillar to which the muscles are fastened. The body works to create new bone tissue, and as the mass reaches a certain level after three months, it is responsible for replacing the bones. The value of osteoclasts peaks in a person's mid-thirties, when bone tissue regeneration is still occurring, and the body starts to lose more bone tissue than was created after that age (Ali & Malih, 2022).

In women, the volume of bone tissue decreases during the period of menopause due to the decrease in estrogen in the blood, and this is the main reason for women, which results in the loss of more bone tissue, as the estrogen hormone secreted by the ovaries in women reduces the dissolution of calcium in the bones and activates them, so at the age of climacteric when fragility decreases and thus a decrease in bone mass (Younes & Amin, 2020).

These days, osteoporosis is more common in women, which is a problem for many of them, especially since it is a disease without any warning signs before it manifests. The researcher, a

specialist, decided to investigate this issue further and present some solutions that can be overcome, symbolized in the use of callanetics exercises, as these exercises function effortlessly and are straightforward movements that activate the muscles surrounding the bones. Additionally, women with this disease find it difficult to practice daily life activities.

The inability of the bones to maintain their calcium and salt content results from the lack of movement, which causes poor blood circulation, which in turn affects calcium delivery to the bone tissue. Hence the importance of the research in the use of callanetics exercises that work to stimulate blood circulation and thus maintain the proportions of calcium that reach the bones, which leads to the protection of bone density in women with osteoporosis, as well as the effect of these exercises in improving the health fitness of the patients (Hameed & Abdullah, 2022).

Callanetics exercises are among the exercises that prevent any stress in the lower back and achieve pressure on the back by extending the spine while simultaneously working to train the surrounding muscles. They are performed with precise movements performed in a very slow motion. Accordingly, we made the following hypothesis: There will be statistically significant differences between the pre and post-test in some components of the health fitness of the research sample.

2. METHODS

2.1. Design

With the exception of one factor that the researcher controls in order to be able to determine its impact on the dependent variables, the researcher used the experimental approach with one group. The experimental approach involves an attempt to control the major factors affecting the change of the dependent variables (Mahgoub, 2005; Kadhum & Malih, 2022).

2.2. Participants

The sample included women with osteoporosis of the Department of Physiotherapy at Baghdad Hospital, aged 45–55 years, during the period from 1/3/2022 to 9/8/2022. It was necessary to select the research sample using the vertical method in order to obtain accurate data. In addition to their agreement to apply the program to them and their commitment to attend, they were chosen for a number of reasons, the most crucial of which was the early cessation of menstruation. They were also chosen because no one in their family had weak bones or took medication to treat tumors or the thyroid gland.

2.3. Instruments

A questionnaire was sent out to 10 experts and specialists in this field, to get their opinions in order to determine the most crucial elements of healthy fitness after reviewing the scientific sources and conducting in-person interviews. After gathering the data, the findings led to the nomination of three components, each of which had an agreement rate of at least 50%.

In order to determine the tests for the health fitness components that were nominated by the experts, the researcher looked at the sources and references, prepared a questionnaire for the tests and presented it to a group of 10 experts and specialists. Following the data collection, the findings led to the nomination of a set of tests that received semi-agreement (85%) or higher, which includes the squat test, the flexibility test behind the thigh and lower back, and the measurement of the thigh and hip circumferences.

First test - Flexibility test behind the thigh and lower back: The test's objective is to gauge the lower back and thigh muscles' flexibility (Ali & Uaid, 2021). The instruments consist of registration forms and a box with a ruler fixed to it (Alwan, 2021). The performance is carried out while the laboratory is in a long seated position, with the arms extended forward to touch the feet and the torso bent as far forward as possible. The recording determines their centimeter-to-centimeter separation (Al-Tarfi, 2013).

Second test - The muscular endurance test: It measures the strength endurance of the muscle groups involved in knee flexion and extension. The test is carried out while standing, with the knees bent and fully extended as a partner helps the other person calculate the number until all energy has been expended. Counting each time the knees are bent and then extended until the effort is finished (Mohammed, 2018).

Third test - Raising the legs from lying down test: The test's objective is to gauge the abdominal muscles' strength. The lying position is used to determine performance specifications. The colleague stabilizes the humerus area from the inside as the tester raises the two legs together to the vertical position and performs the action as many times as they can. In order to register, one counts the correct attempts (Al-Mayyah, 2021).

Fourth test - Physical Composition: The body circumferences were measured using a tape measure and in accordance with the legislative guidelines chosen by the experts. The action that was taken was as follows (Hussein and Salih, 2022):

1. Determine the hip's circumference by standing with the heels together and wrapping a measuring tape around the hip's largest circumference.

2. Measure the circumference of each thigh starting at the top and ending just below the hip.

2.4. Exploratory experiment

The exploratory experiment, which is similar to the primary experiment, was carried out by the researcher in order to obtain objective results. Before conducting the primary experiment, its purpose is to identify the challenges and obstacles so that the researcher can overcome them and avoid them (Al-Selmi et al., 2019). The purpose of the exploratory experiment, which involved a sample of three injured women, was to determine whether the exercises were appropriate for the sample members and to confirm the validity of the devices and tools used in the experiment as well as the suitability of the tests for the research sample's participants. The tests and exercises were found to be appropriate for the research sample and appropriate in terms of both difficulty and ease by the exploratory experiment.

2.5. Scientific basis of the tests

First-Honesty: If the test is presented to several experts and specialists in the field that it measures, and they determine that it measures what is intended to be measured, the test is considered valid (Ali et al., 2023). As a result, the researcher used the content validity method and showed the tests to a panel of professionals. Due to the tests' achievement of an agreement rate greater than 70%, it was determined that they are valid (Alwan, 2022).

Second-Reliability: It means the degree to which the test accurately or consistently measures the phenomenon being measured (Al-tae & Flayyih, 2023). The researcher used the test-and-retest method to confirm the stability, and the results of the simple correlation coefficient that was extracted between the test and its retest revealed that the stability coefficient values were high, as shown in Table 1.

Third-Objectivity: The degree to which the judge or examiner is free from subjective considerations is referred to as objectivity (Nikkeh et al., 2022). The researcher used the scores of two arbitrators during the re-test to confirm the test's objectivity. She then calculated the correlation coefficient between the two arbitrators' scores. Table 1 presents the findings, which demonstrated the tests' high level of objectivity.

Table 1. Values of the stability coefficient and the objectivity coefficient of the tests

Tests	Stability coefficient	Sig.	Statistical significance	Objective coefficient	Sig.	Statistical significance
Lifting both legs from lying down	892%	<0.01	Significant	914%	<0.01	Significant
Flexibility	884%	<0.01	Significant	951%	<0.01	Significant
Bend and extend the knees as much as possible	912%	<0.01	Significant	926%	<0.01	Significant

2.6. Intervention program

In order to prove the validity of a set of callanetics exercises for patients with osteoporosis, the researcher prepared them and presented them to a group of experts and specialists. One of the exercises' validities is oxidation. Based on the results of the exploratory experiment, the duration of the application of the exercises was 24 weeks, with 2 rehabilitative units per week (Sunday, Tuesday), and the number of rehabilitative units reached 48 rehabilitative units, as the time of the rehabilitative unit ranged from 7 to 16 minutes. The researcher considered the gradient in the exercises, and its intensity ranged from 30% to 50%.

The research sample was examined and measured in the Department of Physiotherapy. Prior to the beginning of the application of the exercises, the pre-tests were completed. Then the assistant work team applied the qualifying units to the experimental research sample. Finally, the post-tests were carried out for all the variables that had been measured in the pre-tests and under the same circumstances. This was done after the exercises had been applied to the research sample.

2.7. Statistical analyses

The researcher used the SPSS (Statistical Package for the Social Sciences), version 23, to carry out the statistical analyses. Arithmetic means, standard deviations, and t-tests values were calculated for the related samples.

3. RESULTS AND DISCUSSION

The results of the variations between the pre- and post-tests of the studied variables in the research sample are presented and discussed. Table 2 demonstrates that because the significance values were less than the significance level of 0.05 and in favor of the post tests of the research sample, the calculated t values were significant in the tests of lifting the legs while lying down, flexibility, flexion and extension of the knees, hip and thigh circumference, and osteoporosis.

Table 2. Comparison of the pre-test and post-test results

Variables	Unit	Pre-test		Post-test		t	p
		Mean	SD	Mean	SD		
Lifting both legs from lying down	Number	9.70	1.20	10.43	1.42	2.81	0.022*
Flexibility	cm	1.01	6.31	2.00	6.20	3.42	0.001*
Bend and extend the knees as much as possible	Number	10.01	1.58	11.10	1.65	4.24	0.001*
Hip circumference	cm	118.3	12.31	116.88	11.88	4.27	0.001*
Thigh circumference	cm	58.7	2.63	58.22	2.58	2.29	0.053
Osteoporosis	Degree	-2.96	-0.71	-3.04	0.68	2.53	0.035

* $p < 0.05$

The researcher credits these variations to the use of callanetics exercises, which assisted in enhancing blood circulation, activating the abdominal muscles and surrounding muscles, and supplying the muscles with blood during muscular activity. This helped to deliver more oxygen and food to the bone during the application of the exercises (Zaher, 2011). The researcher also attributes the results of the flexibility test, which came in favor of the post-test, to the application of exercises in a variety of positions that helped to strengthen the muscle fibers that connect the bones where the flexibility of the joints depends on the ability of the ligaments and tendons to be elastic and increase blood flow to the bone, which provides opportunities for increasing minerals and other materials needed for bone (Mahmoud, 2018). The researcher also credits the exercises with improving muscular endurance, as evidenced by the results of flexing and extending the knees. This is because the exercises involved a variety of muscle groups, activating weak and inactive ones in the process, strengthening them and enhancing their capacity to work for an extended period of time.

4. CONCLUSIONS

The callanetics exercises applied produced a decrease in the percentage of fat, with a decline in the values of hip and thigh circumferences. As the physical composition can change with exercise as the muscle weight increases and the fat weight decreases, the continuous work for a period of 24 weeks affected the activation of the motor system of the body, improving and revitalizing the bones, and reducing their fragility among the sample members. This is because the exercises are distinguished by long temporal performance and engage the maximum number of muscles (Al-Kilani, 2005). The researcher credits the application of exercises for the results of osteoporosis because the callanetics exercises speed up blood circulation and increase the amount of blood flowing to the bone, which increases the opportunity for the bones to obtain nutrients and this is reflected in the improvement of bone components and the reduction of fragility. The exercises also stimulated the bones to absorb minerals, such as calcium and phosphorus. According to Hazaa (2009), increased physical activity has a positive impact on bone density and growth, and there is a negative impact when resting and not moving on bone density. Also, the plasticity of the bones, which increased their density, was a result of the application of exercises. Exercise will therefore improve bone components and decrease bone fragility by working to nourish the bones and provide them with the nutrients and elements needed to maintain their density as they work to stimulate blood circulation. Sameaa (2004) confirmed that the application of physical exercises aids in the absorption of calcium and phosphorus from bone densities, thereby reducing bone mass loss. Exercising to strengthen and revitalize the body's muscles is beneficial for stimulating blood circulation and thus stimulating blood flow to the bone itself, which increases the chances of providing minerals and other materials required to build a strong and healthy bone. Therefore, physical activity reduces bone mineral content loss.

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CONFLICTS OF INTEREST

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