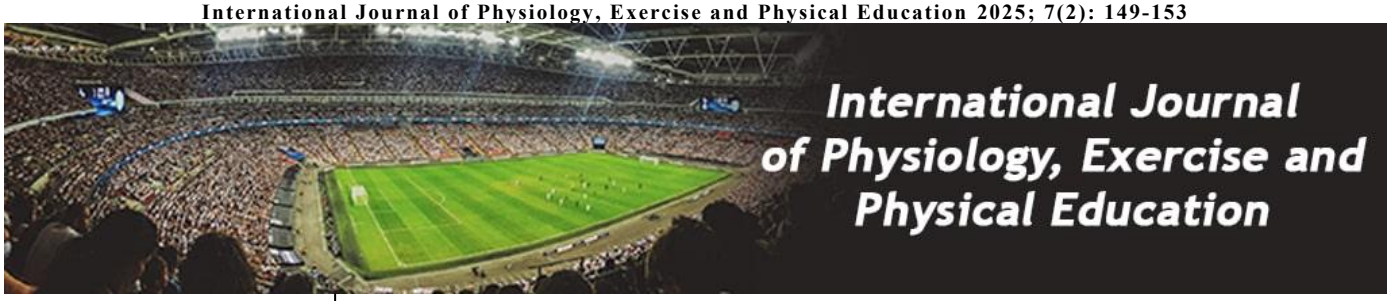

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The effect of High-Intensity Spatial Compound Exercises (HISCE) accompanied by music on certain anthropometric variables and motor abilities of female trainees aged 30-40 years

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Abstract
The present study aims to design high-intensity spatial compound exercises (HISCE) accompanied by music for female trainees aged 30-40 years, and to investigate their effect on certain anthropometric variables and motor abilities in this age group.
The experimental method was employed using a one-group pre-test/post-test design, as it was deemed suitable for the nature of the research problem. The research population consisted of female trainees aged 30-40 years who regularly attended Alaa Gym for fitness training (a women-only facility where the researcher works as a trainer). The total number of trainees was (20), of whom (3) were selected for a pilot experiment, and another (3) were excluded due to health problems. Consequently, the main research sample comprised (15) trainees, representing (75%) of the original population.
The Statistical Package for the Social Sciences (SPSS) was used to process the data and extract the results. The findings revealed that HISCE accompanied by music had a positive effect on body mass and circumferential measurements in the research sample. Furthermore, these exercises positively influenced certain motor abilities, namely flexibility, balance, and coordination.
The researcher recommends regular monitoring of body weight to avoid sudden increases and to maintain weight control continuously. Additionally, it is advised to incorporate HISCE accompanied by music in fitness centers to achieve rapid results and attain an optimal body weight.

Keywords: HISCE, anthropometric variables, motor abilities, female trainees

1. Introduction and research problem
Sport is not merely a means of losing excess weight; it is a fundamental component in maintaining our health and preventing various diseases and injuries. If dietary plans for weight loss exclude the recommendation of engaging in physical exercise, they can be considered incomplete and inadequate. Exercise plays a vital role in enhancing health-related fitness, toning muscles, and achieving an optimal balance between the food we consume and the energy we expend, which helps reduce or even prevent body flabbiness. When exercise is performed regularly daily or at least four times a week positive results in weight loss begin to appear gradually, and the body attains optimal physical fitness. Physical activity is a key factor in achieving and maintaining a healthy weight, serving as an extremely effective tool. Moreover, exercise plays a major role in developing important components of physical fitness, significantly enhancing an individual's overall health and psychological well-being. Conversely, poor physical fitness can lead to negative effects that pose significant challenges, particularly for women.
With the growing prevalence of women-only fitness centers, new ideas have emerged regarding methods of implementing exercise programs. Drawing on her own experience as a trainer, the researcher sought to introduce a new approach that incorporates a series of High-Intensity Spatial Compound Exercises (HISCE) accompanied by musical rhythm. This method replaces the monotonous routines adopted by some gyms when training female participants. In addition, some exercises currently used in gyms can be overly strenuous, potentially causing injuries during execution. Therefore, it was deemed necessary to develop a new training method that could be performed by each trainee without harm or boredom, tailored to her own motor capabilities.

The researcher explains that these exercises consist of movements performed in place, starting at a high pace, which slows down upon fatigue, while performance continues without interruption. They combine arm, leg, and trunk exercises performed simultaneously, with the condition that participants do not stop during the session. Rest periods are active rather than passive, even during fatigue.

The significance of this research lies in examining the effect of High-Intensity Spatial Compound Exercises (HISCE) accompanied by music on certain anthropometric variables and motor abilities of female trainees aged 30-40 years, with the aim of providing scientific insights and accurate indicators of these effects that may assist professionals working in the field of sports training.

1.1 Research objectives

- To design High-Intensity Spatial Compound Exercises (HISCE) accompanied by music for female trainees aged 30-40 years.
- To investigate the effect of HISCE accompanied by music on certain anthropometric variables and motor abilities of female trainees aged 30-40 years.

1.2 Research hypothesis

- There are statistically significant differences between pre-test and post-test measurements in certain anthropometric variables and motor abilities of female trainees aged 30-40 years.

1.3 Research scope

- **Human scope:** Female trainees aged 30-40 years.
- **Time scope:** From April 3, 2025, to June 3, 2025.
- **Place scope:** Alaa Gym for Fitness, located on Street 62, Baghdad.

2. Research methodology and field procedures

2.1 Research method

The experimental method was employed using a one-group pre-test/post-test design, as it was deemed suitable for the nature of the research problem.

2.2 Research population and sample

The research population consisted of female trainees aged 30-40 years who regularly attended Alaa Gym for fitness training (a women-only facility where the researcher works as a trainer). The total number of trainees was (20). Three (3) participants were selected for the pilot study, and another three (3) were excluded due to health issues. Consequently, the main research sample comprised fifteen (15) trainees, representing 75% of the original population.

Sample homogeneity

Homogeneity was tested among the participants in terms of height, weight, and age.

Table 1: Homogeneity of the sample in height, body mass, and age variables

Variables	Unit of Measurement	Sample Size	Mean	Std. Dev.	Median	Skewness
Height	cm	15	160.53	4.103	162	-0.629
Body mass	kg	15	80.27	6.352	80	-0.032
Age	years	15	36.8	3.385	38	-1.23

From Table (1), it is evident that the skewness values for all variables lie between (±1), indicating that the sample is homogeneous.

2.3 Tools, instruments, and equipment used

1) Arabic and foreign references and literature.
2) Data collection form.
3) Restameter device for measuring body mass and height.
4) Measuring tape (cm and subunits).
5) Sound system.
6) Foam mat.
7) Stopwatch.
8) 15 pairs of dumbbells of varying weights (1-3 kg).
9) 15 kettlebells weighing 2 kg each.

2.4 Measurements and tests used in the research

1) Body mass measurement

- **Reference:** Yiannis Aggelonidis, 2004, p. 304
- **Device:** Restameter for measuring body mass and height.
- **Unit:** Kilograms (kg).
- **Instructions:** The subject stands barefoot in the center of the device platform, distributing body weight evenly on both feet, with the body upright and balanced.
- **Recording:** The reading is taken in kilograms.

2) Total body height measurement

- **Reference:** Ali Saloom Jawad, 2004, p. 49
- **Device:** Restameter for measuring weight and height.
- **Unit:** Centimeters (cm).
- **Anatomical Points:** From the vertex of the head to the point of contact between the feet and the base of the device.
- **Instructions:** The subject stands in the center of the device's base, back against the vertical column, touching it at three points (between the scapulae, the most posterior point of the buttocks, and the calves). The horizontal headpiece is lowered to touch the top of the skull, parallel to the floor. The subject inhales to straighten the spine, and after the headpiece is secured, exhales before the reading is taken.
- **Recording:** The number aligned with the headpiece represents the subject's height.

3) Body circumferences

Circumference measurements were taken at agreed anatomical landmarks using a measuring tape (cm).

Measured regions included:

a) Upper arm circumference
b) Waist circumference
c) Hip circumference
d) Thigh circumference

(Ahmed Mohamed Khater, Ali Fahmi El-Beik, 1984, pp. 91-103)

4) Tests used in the research

a) Flexibility test

- **Name:** Trunk Forward Bend from Standing Position
- **Purpose:** To measure spinal flexibility.
- **Unit:** Centimeters (cm).
- **Equipment:** Graduated ruler or measuring board (20 cm, marked in 1 cm units), stable bench or box, and a recording sheet.

- **Procedure:** The subject stands at the edge of the bench, feet aligned with the sides of the scale, and bends forward slowly to reach as far as possible, keeping fingers aligned and parallel to the measuring scale.
- **Recording:** The best of two attempts is recorded in centimeters.

b) Balance test (Farhat, 2001, p. 310) [8]
- **Name:** Bondarchuk Balance Test
- **Purpose:** To measure static balance.
- **Unit:** Minutes (min).
- **Equipment:** Electronic stopwatch, flat surface.
- **Procedure:** The subject stands on the right foot, with the left foot resting on the right knee, left knee pointing outward, and hands resting on the hips.
- **Recording:** Three trials are given; the best time is recorded.

c) Coordination test (Hassanien, 1987, p. 411) [10]
- **Name:** Numbered Circles Test
- **Purpose:** To measure leg-eye coordination.
- **Unit:** Seconds (s).
- **Equipment:** Electronic stopwatch, eight circles (60 cm in diameter) drawn on the ground and numbered 1-8.
- **Procedure:** Starting in circle 1, the subject jumps with both feet together to each successive circle until reaching circle 8, as quickly as possible.
- **Recording:** The time taken to complete the sequence is recorded in seconds.

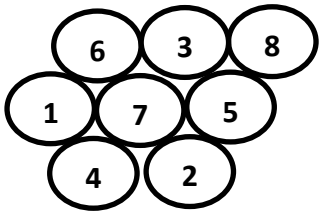

Fig 1: Shows the coordination test

5) Pilot study

A pilot study was conducted on a sample of three female trainees from the same population but outside the main research sample, in order to assess the validity and applicability of the selected tests. The pilot study was implemented on Thursday, April 3, 2025, at 5:00 p.m. The objectives were as follows:
- To determine the time required to perform the tests.
- To assess the ease or difficulty of the tests for the participants.
- To evaluate the accuracy of the measuring instruments used.
- To ensure the correct execution of the tests by the assisting team.
- To identify any potential difficulties the researcher might encounter during application.

2.5 Pre-tests

Pre-tests were conducted on Sunday, April 6, 2025, at 5:00 p.m. for the main research sample. The measurements included anthropometric data as well as motor ability tests for flexibility, balance, and coordination.

2.6 Main experiment

Based on scientific references and personal expertise, the researcher prepared and designed the training units, which consisted of High-Intensity Spatial Compound Exercises (HISCE) accompanied by music. These exercises were tailored to match the age and capabilities of the participants. The application of the training units followed these principles:
- The training program began on Tuesday, April 8, 2025, at 5:00 p.m., and the last training unit was implemented on Sunday, June 1, 2025, at 5:00 p.m.
- The program lasted eight weeks, with three training sessions per week (Sunday, Tuesday, Thursday), totaling 24 training units.
- The intensity followed a progressive overload principle, starting at 40% of maximum repetition in the first week and gradually increasing to 75% by week eight.
- The program involved a high percentage of movements engaging both large and small muscle groups.
- Each session began with low-intensity movements (e.g., walking in place) synchronized with slow music. As the music tempo increased, exercise intensity progressively rose until the participants reached fatigue. This was followed by an active recovery phase (walking in place) to restore energy, and the cycle was repeated until the end of the session.
- The sessions included a variety of movements to match the participants' abilities in this age group, ensuring no monotony due to the diversity of HISCE with music.
- All exercises were performed continuously throughout the session, accompanied by engaging and motivating music.
- Each training session lasted 45-60 minutes, including warm-up, the main part, and cool-down:
  - **Warm-up:** 15 minutes
  - **Main part:** 20-35 minutes
  - **Cool-down:** 10 minutes

2.7 Post-tests

Following the completion of the eight-week HISCE training program accompanied by music, post-tests were conducted on Tuesday, June 3, 2025, at 5:00 p.m. These tests included anthropometric measurements and motor ability assessments for flexibility, balance, and coordination.

2.8 Statistical methods

The Statistical Package for the Social Sciences (SPSS) was used for data analysis.

1) Presentation and discussion of the pre- and post-test results of body circumferences in the research sample

Table 2: Statistical indicators of pre- and post-test results for body mass and circumferences in the research sample

Variables	Unit	Pre-test Mean ± SD	Post-test Mean ± SD	Δ Mean	Δ SD	t-calculated	df	p-value	Significance
Body mass	kg	80.27 ± 6.352	76.33 ± 6.287	-3.933	0.228	-17.238	14	0.00	Significant
Arm circumference	cm	33.8 ± 2.704	31.4 ± 2.694	-2.4	-0.01	-18.33	14	0.00	Significant
Waist circumference	cm	90.33 ± 6.863	87.2 ± 6.178	-3.133	-0.685	-10.783	14	0.00	Significant
Hip circumference	cm	111.2 ± 4.632	108.27 ± 4.48	-2.933	0.153	-19.138	14	0.00	Significant
Thigh circumference	cm	62.13 ± 3.642	59.93 ± 3.615	-2.2	0.107	-20.579	14	0.00	Significant

At a significance level of $p \leq 0.05$ with 14 degrees of freedom, the results in Table (2) indicate statistically significant differences between pre- and post-test results for body mass and circumferences, favoring the post-test measurements.

The researcher attributes these differences to the effectiveness of the High-Intensity Spatial Compound Exercises (HISCE) accompanied by music used in the training sessions. These exercises targeted all parts of the body, contributing to the reduction of both body mass and circumferences. This aligns with the opinion of Bob Zd (2000, p.108), who stated that regular performance of such exercises increases energy expenditure, leading to a reduction in body fat percentage, ensuring proportionality between body circumferences. The reduction in these circumferences, especially in the abdomen, hips, and thighs areas with high fat accumulation and large muscle groups adds both aesthetic and health benefits to women.

Furthermore, continuous training of various body parts contributed to breaking down fat deposits in these regions. The researcher supports A'ed Fadel's (1999, p.195) statement that there is no exercise specifically designed to remove fat from one body region alone, as fat breakdown occurs according to the density of fat accumulation, with higher breakdown rates in areas of greater fat deposits.

2) Presentation and discussion of pre- and post-test results of motor abilities in the research sample

Table 3: Statistical indicators of pre- and post-test results for selected motor abilities in the research sample

Variables	Unit	Pre-test Mean ± SD	Post-test Mean ± SD	Δ Mean	Δ SD	t-calculated	df	p-value	Significance
Flexibility (Sit-and-Reach)	cm	4.13 ± 2.2	10.80 ± 3.726	6.667	1.526	11.602	14	0.00	Significant
Balance (One-leg stance)	sec	36.93 ± 11.960	8.11 ± 17.754	-28.826	5.794	-4.257	14	0.01	Significant
Coordination (Numbered Circles)	sec	13.40 ± 2.238	11.27 ± 2.058	-2.131	0.180	-20.493	14	0.00	Significant

At a significance level of $p \leq 0.05$ with 14 degrees of freedom, the results in Table (3) for flexibility show statistically significant differences between pre- and post-test measurements, favoring the post-test.

The researcher attributes this improvement to the effectiveness of HISCE in developing flexibility. Flexibility is essential as it "provides comfort and significantly reduces pain" (Baha' Al-Din Salama, 1994, pp. 404-405). The 8-week training period was sufficient for developing flexibility, consistent with Abu Al-Ula and Mohamed Nasr Al-Din (2003, p.59), who noted that 8-10 weeks is generally enough to enhance flexibility, particularly when focusing on muscle elasticity.

The exercises involved wide ranges of motion, utilizing both bodyweight resistance and external weights to push the joints to greater ranges. As Raysan Khuraibet (1998, p.87) [11] highlighted, the use of weights can significantly enhance joint mobility.

Similarly, the results for balance indicate significant improvement, attributed to the precise design of the HISCE program, adherence to training units, and progressive load adjustments over 8 weeks. This aligns with findings by Baker, Webrighta & Ppervin (2008) [14], which showed that six weeks of targeted exercises can improve balance and lower limb muscle fluidity.

For coordination, the improvement is attributed to the multi-component nature of HISCE, which incorporates agility, balance, speed, kinesthetic awareness, flexibility, and accuracy factors essential for coordination (Majid, 1989, p.166). The program was structured to progress from one muscle group to another, from one motor ability to another, and from easier to more complex exercises, ensuring full-body engagement as recommended by Arnold (1979).

3. Conclusions

1) HISCE accompanied by music positively affected body mass and circumferences in the research sample.
2) HISCE accompanied by music positively affected selected motor abilities (flexibility, balance, coordination) in the research sample.

4. Recommendations

- Continuous monitoring of body weight to avoid sudden increases and maintain healthy control.
- Adoption of HISCE accompanied by music in fitness centers to achieve rapid results and reach optimal weight.
- Replication of the experiment on samples of different ages and weights.
- Application of the program to male samples with obesity.
- Raising community awareness on safe and effective weight loss methods, avoiding harmful approaches.

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