Total-body aerobic gymnastic exercises more effective than low intensity steady state to improving body composition in adult women with sedentary

Los ejercicios de gimnasia aeróbica de cuerpo completo son más efectivos que los de estado estable de baja intensidad para mejorar la composición corporal en mujeres adultas con estilo de vida sedentario

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Abstract

Introduction: Total-body aerobic gymnastics involving the whole body offers an innovative aspect regarding afterburn effects.
Objectives: This study aimed to prove that 45 minutes of total-body aerobic gymnastic exercise with 88 beats per minute was significantly more effective than 45 minutes of walking exercise with a low-intensity steady state.
Methodology: Materials and methods, this inferential study used a two-group experimental design involving as many as 50 sedentary adult women to prove that total-body aerobic gymnastic exercises were more effective than LISS exercises in improving body composition. The instrument used is body composition analysis (InBody). The data analysis techniques are the sapphire will test and independent samples t-test.
Discussion: In the total-body aerobic gymnastics group, the body mass index decreased from 29.4 0.22 Kg/m2± to 24.1 ± 0.29 Kg/m2 ($p<0.05$), decreased from 36.2% to ±0.2231.3 ± 0.33% ($p<0.05$), and there was an increase in body muscle percentage from 29.8 ± 0.52% to 33.9 ± 0.67% ($p<0.05$). No significant changes were observed in the walking with LISS group ($p>0.05$).
Conclusions: total body aerobic gymnastics is significantly more effective than walking with LISS in improving body composition.

Keywords

Aerobic gymnastic; body composition; fat mass; liss; muscle mass.

Resumen

Introducción: La gimnasia aeróbica de cuerpo entero que involucra todo el cuerpo ofrece un aspecto innovador en cuanto a los efectos de postcombustión.
Objetivos: Este estudio tuvo como objetivo demostrar que 45 minutos de ejercicio gimnástico aeróbico de cuerpo completo con 88 latidos por minuto fueron significativamente más efectivos que 45 minutos de ejercicio de caminata con un estado estacionario de baja intensidad.
Metodología: Materiales y métodos, este estudio inferencial utilizó un diseño experimental de dos grupos que involucró hasta 50 mujeres adultas sedentarias para demostrar que los ejercicios de gimnasia aeróbica de cuerpo completo eran más efectivos que los ejercicios LISS para mejorar la composición corporal. El instrumento utilizado es el análisis de la composición corporal (InBody). Las técnicas de análisis de datos son la prueba de zafiro y la prueba t de muestras independientes.
Discusión: En el grupo de gimnasia aeróbica de cuerpo entero, el índice de masa corporal disminuyó de 29,4 0,22 Kg/m2± a 24,1 ± 0,29 Kg/m2 ($p<0,05$), disminuyó de 36,2% a ±0.2231,3 ± 0,33% ($p<0,05$) y hubo un aumento en el porcentaje de músculo corporal de 29,8 ± 0,52% a 33,9 ± 0,67% ($p<0,05$). No se observaron cambios significativos en el grupo de caminar con LISS ($p>0,05$).
Conclusiones: la gimnasia aeróbica de cuerpo total es significativamente más efectiva que caminar con LISS en la mejora de la composición corporal.

Palabras clave

Gimnasia aeróbica; composición corporal; masa grasa; liss; masa muscular.

Introduction

Time management is a common barrier to regular exercise, particularly among adult women with sedentary lifestyles such as housewives (Ferhi et al., 2023). These individuals often face time constraints due to work and domestic responsibilities, limiting their ability to engage in structured physical activity. Consequently, there is a growing need for exercise modalities that are both efficient and effective in improving body composition, especially by reducing fat mass and increasing muscle mass, to prevent risks such as sarcopenia and metabolic syndrome (Pieczyńska et al., 2021).

Although various exercise modalities have been explored, the majority of previous studies have primarily focused on resistance training or high-intensity interval training (HIIT) (Casaña et al., 2022; Lo et al., 2021). In contrast, there is a lack of comparative research examining the effectiveness of total-body aerobic gymnastics versus low-intensity steady-state (LISS) walking, particularly in sedentary populations (Puspodari et al., 2022). This gap is important, as both types of exercise are accessible and practical for women with limited time, yet their respective impacts on fat reduction and muscle gain remain underexplored.

Despite the widespread application of both total-body aerobic gymnastics and LISS walking in fitness programs, existing literature offers limited direct comparisons of their respective effects on body composition among sedentary adult women. Most prior research has focused on the physiological and metabolic outcomes of resistance or high-intensity interval training, with minimal attention given to moderate-intensity rhythmic whole-body exercises such as aerobic gymnastics (Casaña et al., 2022; Lo et al., 2021). Furthermore, the majority of studies assessing LISS have concentrated on cardiovascular and endurance benefits rather than detailed evaluations of muscle hypertrophy or fat mass reduction (Kim et al., 2019; Park et al., 2020). This creates a critical gap in understanding which modality better addresses the dual goals of fat loss and muscle gain in populations with limited exercise adherence and time constraints.

Additionally, few studies have explored the long-term adherence and motivational aspects of these exercise interventions in sedentary populations. Total-body aerobic gymnastics involves a 45-minute, with its dynamic movement patterns and musical rhythm, may offer superior engagement and sustainability compared to the more monotonous nature of LISS walking (Buttichak et al., 2023). However, empirical evidence supporting these claims remains scarce (Hassan et al., 2022). Clarifying the differential impacts of exercise intensity, rhythm, and variety on both physiological adaptations and participant adherence is essential for designing optimized, population-specific exercise programs (Czerwińska-Ledwig et al., 2024). Therefore, this study aims not only to compare the physiological outcomes of these interventions but also to provide insights into their practical application for sedentary adult women. Total-body aerobic gymnastics typically involves a 45-minute session performed to music with a consistent tempo such as 88 beats per minute (BPM) and includes coordinated upper and lower body movements (Choudhary & Dubey, 2024). This form of exercise is presumed to be of higher intensity than steady walking, potentially resulting in greater caloric expenditure and broader muscle activation (Oh & Lee, 2023).

However, direct comparisons between total-body aerobic gymnastics and LISS walking in terms of their influence on body composition (i.e., fat mass and muscle mass) are currently limited in the scientific literature. Understanding the differential effects of these two modalities is essential for designing evidence-based physical activity recommendations tailored to the needs of sedentary women, particularly housewives (Czerwińska-Ledwig et al., 2024; Hassan et al., 2022). Accordingly, this study aims to compare the effectiveness of a 45-minute session of total-body aerobic gymnastics at 88 BPM with a 45-minute session of low-intensity steady-state walking in improving body composition among sedentary adult women. The findings of this study are expected to inform the development of more effective, appealing, and accessible exercise interventions for individuals with limited time and high health risks.

Method

This study employed a quantitative inferential approach using a two-group experimental design to compare the effects of two exercise interventions on body composition in sedentary adult women. The primary objective was to determine whether a 45-minute total-body aerobic gymnastics session at 88 beats per minute (BPM) was more effective than a 45-minute low-intensity steady-state (LISS) walking session in reducing fat mass percentage and increasing muscle mass percentage.

Study participants

The participants used were adult women who had a sedentary lifestyle. As many as 50 adult women with sedentary especially housewives, consisting of 25 participants, were intervened for 45 minutes of total-body aerobic gymnastic exercise with a beat of 88 beats per minute, and 25 participants were given an intervention for 45 minutes of walking exercise with a low-intensity steady state. Characteristics of the 50 study subjects before the intervention had an average age of 35± 0.21 years, Average body mass index of 29.3 ± 0.52 Kg/m2, Average fat percentage of 36±0.12%, Average Muscle Mass Percentage of 30,3% ± 0.33, and average metabolic rate of the body per week 250 ± 0.43 MET-minutes/week.

The participants used in this study were adult women identified as having a sedentary lifestyle, particularly housewives. A total of 50 participants were involved, divided equally into two intervention groups: 25 participants received 45 minutes of total-body aerobic gymnastics at a tempo of 88 beats per minute, and the other 25 participants performed 45 minutes of low-intensity steady-state (LISS) walking exercise. The inclusion criteria were: (1) women aged between 30–45 years, (2) not actively participating in regular exercise programs (less than 600 MET-minutes/week), and (3) not having any chronic illness that would limit physical activity. The exclusion criteria included: (1) pregnancy, (2) any musculoskeletal injury in the past 6 months, and (3) currently undergoing any form of clinical or pharmacological weight management treatment.

A sedentary lifestyle was defined based on the International Physical Activity Questionnaire (IPAQ) scoring criteria, where participants who recorded physical activity levels below 600 MET-minutes/week were classified as sedentary. This classification was confirmed through an interview and supported by participants' self-reported weekly activity logs. Prior to the intervention, the characteristics of the 50 participants showed an average age of 35 ± 0.21 years, a body mass index of 29.3 ± 0.52 kg/m^2, an average fat percentage of 36 ± 0.12%, an average muscle mass percentage of 30.3 ± 0.33%, and an average weekly metabolic rate of 250 ± 0.43 MET-minutes/week.

Procedures

The concept of the research procedure was explained and carried out for 12 weeks. In the first week, all participants were measured with preliminary data using body mass index (BMI) parameters, body fat mass percentage and fat free mass using inBody/Body Composition Analyzer, then 50 participants were divided into two groups consisting of 25 participants (group A) were given the intervention of 45 minutes of total body aerobic gymnastic with 88 beats per minute and 25 participants (group B) were given the intervention of 45 minutes of walking exercise with low-intensity steady state. The intervention was carried out for 10 weeks with a frequency of 3 exercises per week. It was concluded that all participants were trained 30 times within 10 weeks. Furthermore, in the 12th week, all participants were measured with final data using body mass index (BMI) parameters, total daily energy expenditure (TDEE), body fat mass percentage and body mass percentage using inBody/Body Composition Analyzer.

After the initial measurements were conducted on all participants in the first week, the intervention group allocation was carried out to ensure balanced treatment groups. A total of 50 adult women with a sedentary lifestyle who met the inclusion and exclusion criteria were divided into two intervention groups. The allocation was done randomly using the simple random sampling method. Participant identification numbers were listed, and a randomization process was conducted using a random number generator application to assign them into groups. As a result, 25 participants were assigned to Group A, which received a 45-minute total-body aerobic gymnastics intervention with a tempo of 88 beats per minute (BPM), and 25 participants were assigned to Group B, which received a 45-minute walking exercise intervention with low-intensity steady state (LISS). This randomization aimed to minimize

selection bias and ensure comparable baseline characteristics between the two groups before the intervention was implemented.

Table 1. Training program of total-body aerobic gymnastic with 88 BPM

Total-body aerobic gymnastics with 88 BPM exercise program	Details
Warm-up (10 minutes)	Exercise: Dynamic stretches (upper and lower body extremities) and right aerobic movements (e.g., marching in place, foot-work variations). The target heart rate is 50% if the heart rate is maximal
Main workout (45 minutes)	The number of sets is five sets, with 9 minutes per set. The step frequency is 88 BPM, depending on the koreografi. The target heart rate is 75% of maximal.
Cool-down	Exercise: Static stretches for upper and lower body extremities. This part focuses on body relaxation for recovery. The target heart rate is 50% of maximal heart rate.

Table 1. Explained the total-body aerobic gymnastic exercise program with 88 BPM exercise program. The exercise accompanies the original aerobic gymnastic music rhythm with an 88 BPM beat.

Table 2. The training program of walking with low-intensity steady state

walking with low-intensity steady-state exercise program	Details
Warm-up (10 minutes)	Exercise: Dynamic stretches (upper and lower body extremities) raise body temperature by leisurely walking. The target heart rate is 50% if the heart rate is maximal
Main workout (45 minutes)	Leisurely walk with a pace of 12 minutes/km. The target heart rate is 60% of the heart rate maximal.
Cool-down	Exercise: Static stretches for upper and lower body extremities. This part focuses on body relaxation for recovery. The target heart rate is 50% of maximal heart rate.

Table 2. The walking exercise program with a low-intensity steady state was explained. A total of 25 participants who were given this intervention walked leisurely for 45 minutes with a pace of 12 minutes/km. The target heart rate for exercise is at 60% of the maximum heart rate or is included in the low category.

Statistical analysis

This study is parametric research; the data analysis method used is the normality test (Shapiro Wilk), and the difference test uses an independent samples t-test. This research has fulfilled the principles of humanitarian welfare declared to be ethically appropriate by 7 (seven) The WHO 2011 Standards include: 1) Social Values, 2) Scientific Values, 3) Fair Assessment and Benefits, 4) Risks, 5) Persuasion/Exploitation, 6) Confidentiality and Privacy, and 7) Informed Consent, as outlined in the 2016 CIOMS Guidelines. Meeting the criteria for each standard demonstrates compliance. The research process has been approved by the Center Research Ethics Commission at Universitas Negeri Surabaya with registration number No.004/UN18.III.9/DL.02.04/2024

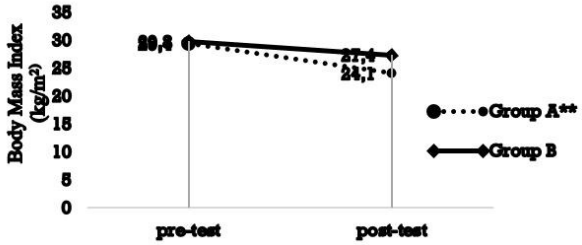
Results

Table 3. Characteristics of participants before the intervention

Group	Age	Body mass index (Kg/m$^{2)}$
Group A	35,2 ± 0.11 years	29.4 ± 0.52
Group B	34,9 ± 0.16 years	29.8 ± 0.61

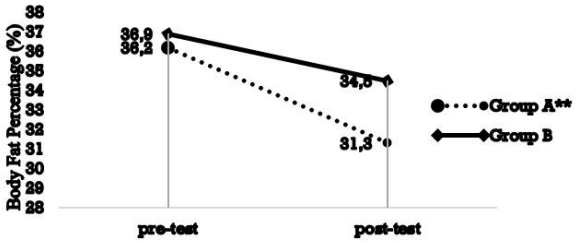
Description, Group A: Given a total body aerobic exercise intervention of 88BPM, Group B: given a low-intensity walking intervention.

Figure 1. Decrease in body mass index



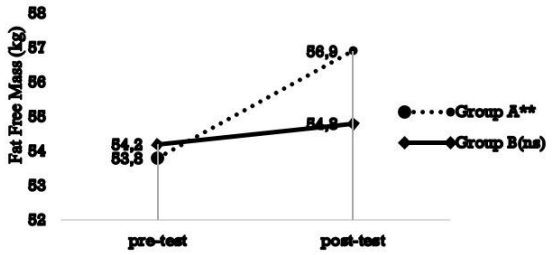
Description, **: this group had a greater average decrease in body mass index.

Figure 2. Decrease in body fat percentage



Description, **: this group had a greater average decrease in body fat percentage.

Figure 3. Fat free mass of all participants



Description, **: this group had a greater average increase in fat free mass, ns: non-significant p>0.05.

Table 4. It was explained that participants who were given a 45-minute total-body aerobic gymnastic exercise intervention were significantly more effective in lowering body mass index than participants who were members of group B who were given a walking exercise intervention with LISS ($p<0.05$). Furthermore, participants who were given a 45-minute total-body aerobic gymnastic exercise intervention were significantly more effective in reducing body fat percentage than participants who were members of group B who were given a walking exercise intervention with LISS ($p<0.05$). Table four also explained that participants who were given a 45-minute total-body aerobic gymnastic exercise intervention were significantly more effective in increasing body muscle percentage than participants who were members of group B who were given a walking exercise with LISS ($p<0.05$).

Table 4. Body mass index, Body Fat Percentage (BFP), Fat Free Mass (FFM) values, and total daily energy expenditure (TDEE) of the participants

Measurement	Group	Pre-test (Mean SD)	Post-test (Mean SD)	p-value
Body mass index (Kg/m$^{2)}$	Group A**	29.4 ± 0.22	24.1 ± 0.29	0.001*
	Group B	29.8 ± 0.31	27.4 ± 0.11	

BFP (%)	Group A**	36.2±0.22	31.3 ± 0.33	0.001*
	Group B	36.9±0.12	34.5 ± 0.23	
FFM (kg)	Group A**	53.8 ± 0.52	56.9 ± 0.67	0.001*
	Group B	54.2 ± 0.66	54.8 ± 0.73	

Description, *: $p < 0.05$ means that there is a significant difference, **: This means that the group has a larger mean difference between the pre-test and post-test.

Discussion

This study aimed to compare the effectiveness of total-body aerobic gymnastics and low-intensity steady-state (LISS) walking exercises in improving body composition among sedentary adult women. The results demonstrated that participants in the total-body aerobic gymnastics group experienced a significantly greater reduction in body fat percentage and a greater increase in muscle mass percentage compared to those in the LISS walking group (Adila et al., 2023). These findings are consistent with previous studies suggesting that higher-intensity, full-body movement patterns lead to greater energy expenditure and more favorable body composition outcomes than low-intensity activities. Kumar and Pandey (2023) also reported superior fat loss effects from high-intensity aerobic routines compared to LISS protocols in women aged 30–45 years.

The current study extends this evidence by applying a structured 10-week intervention specifically among sedentary housewives, a subgroup often underrepresented in exercise trials. Total-body aerobic gymnastic involving the whole body at high intensity offers a more significant cardiovascular challenge than LISS. The increased heart rate during exercise encourages the cardiovascular system to work harder, which contributes to increased aerobic capacity and heart strength (Paria et al., 2024). For adult women who live a sedentary lifestyle, this improvement in cardiovascular fitness can improve overall health conditions and reduce the risk of heart disease, hypertension, and metabolic disorders (Youssef et al., 2022).

Total body gymnastic that involve the whole body are usually done with upbeat musical accompaniment, creating a fun and rhythmic atmosphere (Casaña et al., 2022). This intervention can have a positive psychological impact on participants, improve mood, and reduce stress. For adult women who tend to experience high-stress levels and have low motivation to exercise, this factor can be an additional boost to staying committed to their exercise program (Andriana et al., 2022). On the other hand, LISS, which has a slower tempo, tends to have a lower psychological effect and is less attractive to some participants (Ashadi et al., 2024). The blend of dynamic movement, intensity levels, and music in total-body aerobic gymnastics can provide a more engaging workout experience, increasing motivation and adherence to the exercise program (Chiu et al., 2023). This is crucial for individuals with sedentary lifestyles who often have trouble maintaining consistency in their exercise routines. With an exciting routine and results that can be seen quickly, adult women who participate in total-body aerobic gymnastics tend to continue their exercise program in the long term (Rott et al., 2024).

The increased effectiveness of total-body aerobic gymnastics may be attributed to multiple factors. First, the use of large muscle groups during rhythmic, continuous movement likely contributed to higher caloric expenditure during the 45-minute sessions. This aligns with Gargallo et al. (2024), who observed that activating multiple muscle groups in coordinated movement patterns enhances both energy expenditure and neuromuscular engagement. Moreover, the potential contribution of excess post-exercise oxygen consumption (EPOC), also known as the afterburn effect, may explain part of the superior fat loss observed in this group. Nuttouch et al. (2023) found that high-intensity aerobic activities induce greater EPOC responses than LISS, thereby increasing post-exercise energy expenditure. Importantly, the observed increase in muscle mass in the aerobic gymnastics group is noteworthy. Muscle hypertrophy is not commonly emphasized as an outcome of aerobic training; however, the repetitive engagement of large muscle groups may have provided sufficient stimulus for muscle retention or slight gains (Nuttouch et al., 2023).

Sánchez-Roa et al. (2024) previously highlighted that aerobic modalities involving resistance-like movements, such as lunges or squats within aerobic choreography, may contribute to improved lean mass, particularly in previously sedentary individuals. However, it is essential to interpret these findings within the limitations of the study design (Choudhary & Dubey, 2024). The sample consisted solely of

sedentary adult women, primarily housewives, which limits generalizability to other populations such as men, older adults, or individuals with comorbidities. Additionally, while the study utilized random assignment, the absence of a non-exercising control group makes it difficult to determine whether observed changes were entirely due to the exercise modalities or partially attributable to other uncontrolled variables (e.g., dietary changes, daily activity level outside the intervention) (Gargallo et al., 2024). Moreover, although body composition was assessed using a bioelectrical impedance analyzer (InBody), this method is sensitive to hydration status and time of measurement, which were controlled but not rigorously standardized (Sánchez-Roa et al., 2024).

Another limitation is the relatively short intervention duration (10 weeks) and follow-up period. While significant changes were detected within this timeframe, longer-term studies are needed to assess whether the benefits of aerobic gymnastics persist or are superior to LISS over time. Furthermore, adherence to the intervention and subjective factors such as exercise enjoyment or motivation were not systematically measured, despite their potential influence on outcomes. Prior research (Chiu et al., 2023) emphasizes that exercise adherence, especially among sedentary individuals, is closely tied to enjoyment and group dynamics variables that may have favored the more engaging aerobic gymnastics format in this study.

Despite these limitations, the study contributes to a growing body of literature advocating for the use of structured, rhythmic, and engaging aerobic exercise as an efficient approach to improving body composition, especially among time-constrained populations. The combination of cardiovascular, neuromuscular, and psychological stimulation offered by total-body aerobic gymnastics makes it a promising intervention, particularly for adult women facing barriers to traditional fitness routines.

Overall, although studies comparing total-body aerobic gymnastics workouts with leisurely walking (LISS) show many advantages, there are some limitations to be aware of. This study only included adult women with a sedentary lifestyle. On the other hand, data suggests that working women may be more prone to obesity due to various lifestyle-related factors, stress, and lack of time. To achieve more valid and generalizable results, further research with larger samples and longer duration of interventions is needed.

Based on this discussion, total-body aerobic exercise for 45 minutes significantly reduces body fat percentage. It increases muscle mass compared to low-intensity walking (LISS), especially for sedentary adult women. This exercise has advantages in more significant calorie burn, afterburn effects, increased muscle mass, cardiovascular fitness, and a more positive psychological impact (Muhammad et al., 2024). With these various benefits, total-body aerobic exercise can be an ideal solution for individuals with limited time who want to achieve their fitness goals more quickly and effectively (Namboonlue et al., 2024).

Conclusions

This study found that total-body aerobic gymnastics performed at 88 beats per minute for 45 minutes, three times per week, led to significantly greater reductions in body fat percentage and improvements in muscle mass compared to low-intensity steady-state (LISS) walking among sedentary adult women. While these findings are promising, they should be interpreted within the context of the study's limitations, including the specific population studied (sedentary housewives), the relatively short intervention period, and the absence of a non-exercise control group. From a practical standpoint, total-body aerobic gymnastics may be a more time-efficient and engaging exercise strategy for health promotion among adult women with limited physical activity and constrained schedules. Health practitioners and fitness professionals could consider incorporating structured aerobic routines involving full-body movements and musical accompaniment into community or home-based fitness programs to enhance adherence and improve body composition outcomes. Future research should expand on these findings by including more diverse populations (e.g., working women, older adults, men), employing longer intervention periods, and exploring additional outcome variables such as psychological well-being, adherence, and cardiovascular health. Moreover, future studies should seek to clarify the mechanisms behind the observed benefits particularly the role of exercise intensity, muscle

engagement, and post-exercise energy expenditure—in order to optimize exercise prescriptions tailored to sedentary individuals.

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