



Impacts of a Walking Program on Uneven Terrain on the Physical Fitness of Climacteric Women

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Abstract

During the climacteric period, a progressive decline in functional capacity occurs. Walking constitutes a low-impact intervention; however, structured training programs and validated test batteries are required to evaluate its effects. The objective of the present study was to determine the physical-functional profile of a group of climacteric women after participating in a four-week walking program that integrated contemporary training methods, using the Romero Sánchez (2018) test battery. A descriptive, cross-sectional, post-intervention study was conducted. Thirty-two women aged between 41 and 49 years, residents of the Consejo Popular Managua, Havana, participated. A four-week walking program was implemented, with a frequency of six sessions per week and a duration of 90 minutes per session. In the main part, continuous, fartlek, tempo, and interval methods were applied, as well as power walking technique, with intensity control using the Rating of Perceived Exertion (RPE) scale. At the end of the intervention, the seven-test battery was administered: 6-minute walk, body mass index (BMI), waist-to-hip ratio (WHR), anterior trunk flexion, sit-to-stand from a chair for 30 seconds, arm flexion and extension, and floor abdominal curls in 30 seconds. Frequencies, percentages, and descriptive statistics were calculated. In the 6-minute walk test, 100% of participants obtained a passing grade (34.4% Excellent) with a mean of 715.3 ± 35.2 m. BMI showed 40.6% normal weight and 43.8% overweight; WHR was classified as intermediate or lower in 93.8% of cases. Anterior trunk flexion registered 37.5% Excellent, but 12.5% obtained Poor. The sit-to-stand test obtained 100% passing. Arm flexion/extension and abdominal curls reached 84.4% and 87.5% passing, respectively. The overall group evaluation was: Excellent 40.6%, Good 6.3%, Fair 40.6%, and Poor 12.5%. After a four-week walking program with high weekly frequency and varied methods, the participants showed satisfactory levels in cardiorespiratory endurance and lower-limb strength-endurance, whereas anterior trunk flexibility and upper-body and trunk strength-endurance persisted as the most deficient components. The battery used allowed the identification of these imbalances, suggesting the need to complement walking with specific flexibility and upper-body strengthening exercises in this population.

Keywords: climacteric; menopause; walking; training; test battery; physical fitness

Introduction

The climacteric constitutes a transitional phase in a woman's life characterized by the progressive decline of ovarian function and the consequent decrease in estrogen levels. This hormonal change is associated with alterations in body composition, loss of bone mass, reduction in muscle strength, and modifications in the cardiovascular profile [1]. Regular physical exercise is recognized as a first-line non-pharmacological strategy to attenuate these effects, with walking standing out due to its safety, low cost, and ease of incorporation into daily routine [2].

To comprehensively assess the physical fitness of climacteric women, standardized instruments are required that allow not only quantification of performance but also classification of functional level. In 2018, Romero Sánchez proposed a battery of seven tests that evaluate cardiorespiratory endurance, body composition, flexibility, lower-limb strength, arm strength, and abdominal muscular endurance, assigning scores and providing an overall evaluation [3].

Although numerous studies on exercise during the climacteric exist, few report the effects of structured walking programs with contemporary training methods (fartlek, tempo, intervals) and measure their impact using standardized batteries. The objective of this study was to determine the physical-functional profile of a group of climacteric women after participating in a four-week walking program with high weekly frequency and varied methods, using the Romero Sánchez (2018) battery.

Methods

Design and setting

A descriptive, cross-sectional, post-intervention study was conducted in July 2026, in the Consejo Popular Managua, municipality of A. Naranjo, Havana, Cuba. Environmental conditions were certified as normal for the time of year by the authorized institutions. All measurement instruments were calibrated by the corresponding metrology laboratory before use. The participating and support staff were trained in the execution of each test and in conducting the training program. The study received approval from the local ethics committee, and the principles of the Declaration of Helsinki were respected. Verbal informed consent was obtained from each participant after a detailed explanation of the procedures.

Participants

Thirty-two women aged between 41 and 49 years (mean 46.5 ± 2.4

years) were included. Eighteen participants (56.3%) were in the climacteric stage and 14 (43.7%) in menopause. All were public administration workers (coded as sector 1 for research purposes). Women with severe cardiovascular diseases, orthopedic limitations preventing walking, or who did not complete at least 90% of the scheduled sessions were excluded.

Intervention program

A four-week walking program was implemented, with a frequency of six days per week (Monday to Saturday) and Sunday rest. Each session had a total duration of 90 minutes, structured as follows:

- **Warm-up (20 minutes):** general joint mobility, dynamic stretching (leg swings, unloaded lunges, trunk twists) and progressive walking from a very gentle pace to the minimum pace of the main part.
- **Main part (60 minutes):** continuous or fractionated walking according to the daily planning, performed on flat terrain and regular surface. Intensity was controlled using the Rating of Perceived Exertion (RPE 1-10) scale, where RPE 2-3 corresponded to strolling pace (70-80 m/min), RPE 4-5 to brisk walking (85-95 m/min), RPE 6-7 to fast walking or power walking (100-110 m/min), and RPE 8-9 to intense walking (115-125 m/min). The following training methods were used: extensive continuous, tempo, fartlek (by time and by sensations), long and short intervals, and ladder series.
- **Cool-down (10 minutes):** very slow walking to progressively reduce heart rate, followed by static stretching of the major muscle groups (calves, hamstrings, quadriceps, glutes, pectorals, and latissimus dorsi), holding each position for 20-30 seconds without pain.

The weekly progression of volume and intensity is detailed in Table 1. The total accumulated volume over the four weeks was approximately 130 km. All participants completed at least 90% of the scheduled sessions.

Table 1. Summary of the four-week training program (60-minute main part)

Day	Week 1 (Adaptation)	Week 2 (Volume and Tempo)	Week 3 (Intensification)	Week 4 (Tapering)
Monday	Continuous easy (RPE 2-3)	Easy tempo: 45' RPE 5 + 15' RPE 3	Extensive tempo: 20' RPE 5 + 20' RPE 4 + 20' RPE 3	Tempo + speed: 15' RPE 4 + 30' RPE 6 + 15' RPE 3
Tuesday	Continuous easy + walking technique	Fartlek: 8 x (2' RPE 6 / 2' RPE 2)	Short intervals: 12 x (1' RPE 8 / 1'30" RPE 2)	Intense intervals: 5 x (3' RPE 8-9 / 3' RPE 2)
Wednesday	Easy fartlek: 6 x (2' RPE 5 / 3' RPE 2)	Long intervals: 3 x (8' RPE 7 / 3' RPE 3)	Fartlek by sensations (RPE 2-6)	Maintenance fartlek: 6 x (4' RPE 7 / 2' RPE 2)
Thursday	Continuous easy (RPE 4)	Regenerative continuous (RPE 2-3)	Regenerative (RPE 2-3)	Regenerative (RPE 2-3)
Friday	Technique + intervals: 4 x (4' RPE 6 / 2' RPE 3)	Progressive pyramid (5' RPE 3 to RPE 6 and back)	Long ladder: 5' + 8' + 12' at RPE 7	Activation: easy walking + 3 x 50 m accelerations at RPE 8

Saturday	Progressive endurance: 30' RPE 3 + 20' RPE 4 + 10' RPE 3	Long endurance (RPE 4-5)	Competitive endurance with simulated 6-min test at the end	Battery application
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Note: RPE: Rating of Perceived Exertion (1-10). Estimated distances per session ranged from 4,500 to 6,600 m, with a weekly volume of 30 km (week 1), 33 km (week 2), 35.5 km (week 3), and 28 km in the five days prior to the test (week 4).

Assessment battery

At the end of the fourth week (Saturday, replacing the training session), the Romero Sánchez (2018) test battery was applied, composed of:

1. 6-minute walk test (distance covered in meters).
2. Body Mass Index (BMI, kg/m²).
3. Waist-to-Hip Ratio (WHR).
4. Anterior trunk flexion in a seated position (centimeters).
5. Sit-to-stand from a chair for 30 seconds (number of repetitions).
6. Arm flexion and extension for 30 seconds (number of repetitions).
7. Floor abdominal curls for 30 seconds (number of repetitions).

Each functional test (except BMI and WHR) received a numerical score from 2 to 5 according to pre-established norms (Poor=2, Fair=3, Good=4, Excellent=5). The sum of points (maximum possible 29) was converted to a percentage and classified as Poor ($\leq 69\%$), Fair (70-79%), Good (80-89%), or Excellent ($\geq 90\%$). BMI was categorized as Underweight, Normal weight, Overweight, Mild obesity, Moderate obesity, and Severe obesity. WHR was classified as Lower, Intermediate, or Upper, with qualitative equivalences according to the battery (Lower and Intermediate are considered lower risk; Upper is associated with

higher cardiometabolic risk).

Sociodemographic and clinical variables

Using a structured questionnaire, the following were recorded: age, reproductive stage (climacteric or menopause), presence of 11 climacteric symptoms (chills, irregular menstrual periods, hot flashes, night sweats, vaginal dryness, sleep disorders, mood changes, body weight changes, muscle or joint pain, transient palpitations; dichotomous Yes/No response), self-reported diseases or conditions, number of children, delivery method (normal or cesarean section), marital status, and employment sector.

Statistical analysis

Qualitative variables were described using absolute frequencies and percentages. For quantitative variables, mean, standard error, median, mode, standard deviation, sample variance, kurtosis, skewness coefficient, range, minimum, maximum, and 95% confidence interval for the mean were calculated. Processing was performed in Microsoft Excel.

Results

Sample characterization

Table 2 presents the sociodemographic and clinical data. The mean age was 46.5 years. The most prevalent climacteric symptoms were chills (65.6%), irregular menstrual periods (62.5%), night sweats and vaginal dryness (59.4% each). The most frequent pathologies were sacrolumbalgia (15.6%), thyroid conditions (12.5%), and circulatory disorders (12.5%). 53.1% had had normal deliveries and 40.6% cesarean sections. The predominant marital status was common-law marriage (28.1%), followed by married (21.9%).

Table 2. Sociodemographic and clinical characteristics (n=32)

Variable	Category	n	%
Stage	Climacteric	18	56.3
	Menopause	14	43.7
Most frequent symptoms (multiple response)	Chills	21	65.6
	Irregular menstrual periods	20	62.5
	Night sweats	19	59.4
	Vaginal dryness	19	59.4
	Hot flashes	17	53.1
	Muscle/joint pain	17	53.1
	Sacrolumbalgia	5	15.6
Self-reported diseases/conditions (multiple response)	Thyroid disorders	4	12.5
	Circulatory disorders	4	12.5
	Asthma	3	9.4
	Vulnerability to stress	2	6.3
	Hypertension + Diabetes	2	6.3
	Gastritis	2	6.3
	Insomnia	1	3.1
	1 child	17	53.1
	2 children	9	28.1
	3 children	4	12.5
Parity	No children	2	6.3

Delivery method	Normal	17	53.1
	Cesarean section	13	40.6
	Not reported	2	6.3
Marital status	Common-law marriage	9	28.1
	Married	7	21.9
	Single	6	18.8
	Divorced	6	18.8
	Widowed	2	6.3
	Not reported	2	6.3

Test battery results

The evaluation by test is summarized in Table 3. The 6-minute walk test and the sit-to-stand test achieved 100% passing. Arm flexion/extension presented the lowest passing percentage (84.4%). According to BMI, 43.8% of participants were

overweight and 9.4% had mild obesity; no cases of underweight, moderate, or severe obesity were recorded. WHR was classified as Lower (50.0%) or Intermediate (43.8%) in almost the entire sample, with only two cases (6.3%) classified as Upper (high risk).

Table 3. Distribution of evaluations by test and passing rate (n=32)

Test	Excellent n (%)	Good n (%)	Fair n (%)	Poor n (%)	Passing (%)
6-minute walk	11 (34.4)	15 (46.9)	6 (18.8)	0 (0)	100
Anterior trunk flexion	12 (37.5)	10 (31.3)	6 (18.8)	4 (12.5)	87.5
Sit-to-stand from chair 30 s	8 (25.0)	13 (40.6)	11 (34.4)	0 (0)	100
Arm flexion/extension 30 s	11 (34.4)	10 (31.3)	6 (18.8)	5 (15.6)	84.4
Floor abdominal curls 30 s	12 (37.5)	11 (34.4)	5 (15.6)	4 (12.5)	87.5

Note: For BMI and WHR, Excellent/Poor scores are not assigned; their categories are presented in the text. The walk test and the sit-to-stand test had no Poor cases.

Body composition:

- BMI: Normal weight 13 (40.6%), Overweight 14 (43.8%), Mild obesity 3 (9.4%). No underweight, moderate, or severe obesity cases were observed.
- WHR: Lower 16 (50.0%), Intermediate 14

(43.8%), Upper 2 (6.3%).

The overall group evaluation, calculated from the sum of points, was: Excellent 13 (40.6%), Good 2 (6.3%), Fair 13 (40.6%), and Poor 4 (12.5%). Overall, 46.9% obtained a high level (Good + Excellent) and 87.5% passed globally.

Descriptive statistics are shown in Table 4. The mean distance in the 6-minute walk test was 715.3 m (SD 35.2; 95% CI: 702.6-728.0). Anterior trunk flexion had a mean of 13.9 cm, with a very wide dispersion (SD 11.4 cm) and a minimum value of -6 cm. The average total score was 23.3 ± 4.4 points.

Table 4. Descriptive statistics for the tests and total score (n=32)

Statistic	6-min walk (m)	BMI (kg/m ²)	WHR	Trunk flex (cm)	Sit-to-stand (rep)	Arm flex/ext (rep)	Abdominals (rep)	Total score
Mean	715.34	26.62	0.79	13.91	19.84	20.25	22.28	23.25
Median	712.00	26.30	0.79	11.00	19.50	21.50	23.00	23.00
Mode	706.00	24.80	0.83	8.00	17.00	18.00	12.00	20.00
Standard deviation	35.20	3.66	0.08	11.42	2.29	6.95	6.11	4.39
Minimum	637.00	20.30	0.68	-6.00	17.00	9.00	12.00	14.00
Maximum	781.00	36.20	1.04	31.00	25.00	33.00	31.00	29.00
Skewness	-0.21	0.96	1.62	-0.01	0.48	-0.07	-0.16	-0.52
95% CI for mean	± 12.69	± 1.32	± 0.03	± 4.12	± 0.82	± 2.50	± 2.20	± 1.58

Discussion

The findings of the present study indicate that, following a four-week walking program with high weekly frequency and application of varied training methods, the participants showed a favorable physical fitness profile in cardiorespiratory endurance and lower-limb strength-endurance, contrasting with persistent limitations in anterior trunk flexibility and upper-body and abdominal strength-endurance.

The 6-minute walk test achieved 100% passing, with a mean of 715

m, a value exceeding those reported in sedentary women of similar age (600-650 m) [4]. The program design, which included intervals at RPE 8-9, tempo sessions, and a simulated 6-minute test at the end of the third week, may have favored both the improvement of aerobic capacity and familiarization with the required effort. The high adherence ($\geq 90\%$) and accumulated volume (~ 130 km in four weeks) support the feasibility of this exercise modality in the studied context.

The sit-to-stand test also achieved 100% passing. This result

reflects a strength-endurance of the hip and knee extensor muscles compatible with adequate functionality, consistent with the weekly walking volume (30-35 km), which imposes a repeated stimulus on these muscles. Nevertheless, arm flexion/extension presented 15.6% Poor cases and the lowest passing rate (84.4%). This finding is congruent with the nature of the program, since walking, even when performed with vigorous arm swing, does not generate a significant overload on the upper body. The loss of muscle strength associated with hypoestrogenism [5] may have contributed to this deficit, which would not be remediable by walking alone.

Anterior trunk flexion showed a mean of 13.9 cm, but with a very high dispersion (SD 11.4 cm) and four participants (12.5%) evaluated as Poor, including negative values. Static stretching was performed exclusively in the cool-down phase (5 minutes at the end of each session), which is insufficient to improve flexibility in women with pre-existing shortening or pathologies such as sacrolumbalgia, present in 15.6% of the sample. The battery thus highlights a component that requires additional specific intervention.

Body composition remained in the overweight (43.8%) and normal weight (40.6%) ranges, with no substantial changes expected, as four weeks of aerobic exercise without dietary intervention do not significantly modify BMI or WHR. Most cases were classified in the Lower or Intermediate WHR categories, with only two cases (6.3%) in the Upper category. This central fat distribution profile is characteristic of the menopausal transition and constitutes a relevant cardiometabolic risk factor [6].

The overall group evaluation showed that 46.9% achieved high levels (Excellent or Good), while 40.6% remained at Fair and 12.5% at Poor. The coexistence of a high percentage of Excellent and Fair suggests a heterogeneous response to the program, possibly modulated by the intensity of climacteric symptoms, the presence of musculoskeletal pathologies, and differences in baseline physical fitness. This variability highlights the need to individualize loads and to complement walking with flexibility and strengthening exercises.

Intensity control using RPE allowed women with different fitness levels to self-regulate effort, a validated and safe method in adult populations. The frequency of six sessions per week and the accumulated volume exceed the minimum physical activity recommendations for adults (150 minutes/week of moderate intensity), which likely influenced the favorable results observed in the endurance and leg strength tests.

Limitations

This study has limitations that should be considered. Firstly, the descriptive, cross-sectional, post-intervention design, without a control group or baseline measurement, precludes establishing a direct causal relationship between the program and the physical profile obtained. Secondly, the sample size is small (n=32) and the population comes from a single center, limiting the generalizability of the results. Thirdly, consent was verbal, although it complies with local regulations; however, written consent is recommended

for future research. Finally, the battery used, although standardized, does not include balance or agility tests, aspects that are also relevant in climacteric women.

Future research lines

Studies with pre-post design and control group are required, incorporating combined interventions (walking plus strength and flexibility exercises) and evaluating the association between climacteric symptomatology and training response. Likewise, long-term follow-up would be of interest to determine the persistence of benefits and the impact on quality of life.

Conclusions

Following the application of a four-week walking program, with 90-minute sessions, six days per week frequency, and varied training methods (continuous, fartlek, tempo, and intervals, controlled by RPE), the participants presented satisfactory levels in cardiorespiratory endurance and lower-limb strength-endurance tests. In contrast, anterior trunk flexibility and upper-body and trunk strength-endurance persisted as the most deficient components of physical fitness. The Romero Sánchez (2018) test battery proved to be a useful instrument for detecting these imbalances. Based on these results, it is recommended that exercise programs aimed at climacteric women include, as a complement to walking, specific stretching and upper-body strengthening sessions, in order to optimize overall physical fitness and reduce the risk of musculoskeletal injuries in this population.

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