

# Effects of walking training performed using continuous and interval methods on weight loss as effective strategies among postpartum women

## Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Data Interpretation
- E Manuscript Preparation
- F Literature Search
- G Funds Collection

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## abstract

**Background:** Walking is a fundamental and affordable physical activity that improves entire body and helps women lose weight. However, some studies suggest that walking alone has little or no effect on improving or maintaining body mass and fat mass at the hip and spine. The objective of this study is to estimate the effect of walking intensity (interval training vs. traditional cardio) on weight loss after childbirth.

**Material and methods:** A total of 39 postpartum women [19 experimental subjects (ES) and 20 controls (CS)] participated in this study. Their homogenates were calculated based on their average age of  $25 \pm 2.54$  years. BMI obese moderate and waist circumference at high-risk, first deliveries to the same educational and social status. The subjects participated in this study to lose excess weight within three months after childbirth.

**Results:** Our results indicate that interval training with fast walking is a powerful tool for developing successful strategies for managing weight loss.

**Conclusions:** We recommend that postpartum women, who use walking to amplify their weight loss, use the following exercise schedule: at least three sets of 400 m (wf  $\approx$  SR)  $\times$  5 per day, nine 400 m (wf  $\approx$  SR)  $\times$  5 sets per week, and 36 sets of 400 m (wf  $\approx$  SR)  $\times$  5 per month.

**Key words:** walking, weight loss, newborn mothers, intensity.

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## INTRODUCTION

Pregnant women experience significant functional and physical changes to nurture and accommodate the developing foetus. These changes affect all of the body's systems [1] at the beginning of the pregnancy, during the pregnancy, and after the childbirth [2]. Body weight and its association with the lipid profile is determined before and after the pregnancy [3]. Body weight and its association with an increase in heat shock protein relative to basal metabolic rate [4] and resting metabolic rate [5] is similarly determined. As a response to estrogen, the body requires more oxygen at rest. In addition, insulin requirements and thyroid size also increase [6]. Previous studies have shown that hormones induce many physical changes in women, which lead to metabolic disorders [7]. Pregnancy results in significant physical and psychological changes in women [8]. Previous studies confirm that regular physical activity is associated with improved physiological, metabolic and psychological parameters as well as reduced risk of morbidity [9]. Physical activity is recommended as part of any weight loss plan. High levels of physical exercise require higher energy expenditure. Walking is a rhythmic, dynamic and aerobic activity of large skeletal muscles that has multiple benefits and minimal adverse effects [10]. Ruth K. Anderson suggests to walking fast for 15 minutes 3 days per week (15–20 fast repetitions) to improve aerobic capacity related to weight loss [11]. According to the American College of Sports Medicine [12], high-intensity walking is more beneficial for women compared with normal walking. Gary Kamen suggests that high-intensity exercises are a major determinant of the energy expenditure balance, which is correlated with higher oxygen debt coupled with resting metabolism [13].

Thus, this comparative study aims to estimate the relationship between walking intensity and its impact on weight loss after childbirth. Previous studies confirm that walking as a regular physical activity improves the cardiovascular function, limits weight gain, reduces musculoskeletal awkwardness, decreases incidence of muscle cramps and lower limb oedema, improves mood stability, gestational diabetes mellitus and gestational hypertension. Furthermore, this exercise can be performed at three different levels of intensity (i.e., low, moderate and vigorous), which are correlated with energy substrates during the expended effort. When performing this exercise, it is possible to experiment with multiple training methods: intermittent, interval training or continuous. In this study, interval training in ES vs. traditional cardio in CS was used as a protocol for monitoring weight loss in ES. In CS, the use of the continuous method for 30 minutes 4 times a week reduced the risk of heart disease, diabetes, obesity, osteoporosis, and other health problems [14]. This differs from ES, who used interval training. Interval training consists of two phases: speed walking followed by slow walking as a recovery phase. For example, 400 m of speed walking followed by 100 m of slow recovery (5 fast repetitions of this exercise). Walking can be performed as brisk walking or as other variations (e.g., speed walking, power walking and race walking) to improve physical fitness. According to Frank Rosato [15], fast walking is a satisfactory activity.

Previous studies indicate that more people perform slow walking (34%) than fast walking (24%) [16]. The purpose of our study is to test the benefit of walking on managing the body weight. The condition of the study is that all participants follow a diet regime (1200–1500 calories per day). The participants' goal is to lose weight to improve fitness, health and well-being.

## MATERIAL AND METHODS

All participants are volunteers. Their reason for participation is to lose extra weight. Postpartum women practice walking as a favourite sport to lose weight. The participants' age is between 24 and 27 years. Their BMI is between 27 and 30. The participants reported that they exercised <3 days/week for <50 minutes/day during the 3 months prior to this study. All participants followed a diet that was designed to lower weight (1200–1500 calories per day). The inclusion criteria were as follows: all lifestyle parameters were fixed (both groups followed the same diet and lifestyle), the women were not pregnant and did not have any medical conditions that disrupted metabolism or body weight or limited ability to exercise.

As an intervention, exercise intensity was prescribed according to the protocol used in this study [interval training (ES) vs. traditional cardio (CS)] for 3 months after childbirth. The CS group walked for 30 minutes four times a week at their own pace using the continuous method. The ES group began their program using the 12 × 100 m (wf ≈ SR) series and then changed to the 5 × 400 m (wf ≈ SR) series at the end of three months. To evaluate the progress, we measured the body weight (to the nearest 0.1 kg) and height (to the nearest 0.5 cm) without shoes using standard medical equipment [17]. BMI was determined using the following formula: body mass (kg) divided by height (m) squared. According to a previous study [18], 1-mile walk (Rockport Walk Test) can be used as a valid predictor of VO<sub>2</sub>max (as an alternative to the 1.5-mile run test) in assessing cardiovascular and aerobic fitness. Waist circumference (WC) was measured at midpoint between the lower margin of last palpable rib and the top of iliac crest [19]. Our data tests (pre- or post-test) were analysed using IBM SPSS 21.0. The means and standard deviations were determined, and the independent T-test and correlation paired samples with a statistical significance set at P < 0.05 were performed.

## RESULTS

The postpartum women are categorised as obese (Moderate or Level 1), based on the BMI values provided by the Japan Society for the Study of Obesity [20]. The VO<sub>2</sub>max values of our participant were in the Fair class range. The waist circumference values were greater than 88 cm (35 in.), which represented an elevated health risk [21]. According to McTiernan [22], the women were metabolically at a high risk of metagenome, which could result in them gaining ≥5 kg of body weight. Thus, our results are in agreement with cross-sectional and longitudinal studies. This suggests that childbearing may be an important contributor to the development of obesity [23]. The pre-test values indicated an inverse relationship between physical activity levels and dietary fat consumption [24] and the well-being of postpartum women [25]. Health experts indicate a relationship between obesity and a decrease in physical activity [26] in this population, which is indicated by Steindorf et al. as insufficiently physically active. Physical activity promotion programs should target women in particular need [27]. In this study, we advanced the interval methods with faster walking to improve walking fitness and to achieve greater weight loss. Similarly to continuous walking as a form of physical activity, interval or intermittent walking had positive effects on weight loss, as indicated by a previous study [28].

Table 1 summarises details about our participants at the beginning of the study (pre-test).

Table 1. Summary of studies addressing the effect of pregnancy on a woman's body

Variables	Sample	No.	Mean±SD	T		Shapiro-Wilk		Levene's	
				V	P	V	P	V	P
Weight (Kg)	ES	19	72.16 ±4.73	0.04	0.96	0.97	0.83	1.37	0.09
	CS	20	72.11 ±3.83						
Height (M)	ES	19	160.36 ±5.36	0.35	0.73	0.96	0.37	0.44	0.73
	CS	20	159.75 ±5.75						
1-MILE (MN)	ES	19	15.89 ±0.96	0.77	0.45	0.94	0.96	0.68	0.72
	CS	20	16.16 ±1.18						
BMI (kg/m <sup>2</sup> )	ES	19	28.05 ±1.06	0.57	0.51	0.93	0.51	2.13	0.64
	CS	20	28.29 ±1.50						
VO <sub>2</sub> max (ml/MN/kg)	ES	19	30.94 ±1.86	0.69	0.49	0.92	0.64	2.18	0.83
	CS	20	31.45 ±2.64						
WC (Cm)	ES	19	113.11 ±5.55	0.27	0.78	0.93	0.55	0.06	0.27
	CS	20	113.56 ±4.84						

Our results confirm that walking has many benefits for postpartum women including cardiorespiratory fitness, heart health, postural development, bone density, injury rehabilitation, pain management, muscle strength and endurance, mobility, stability, balance and body awareness [29]. Record in this study by the significance of independent t-test in favour of the Es group in all comparisons applied. See table 2. Highlight by the researcher in the value of VO<sub>2</sub>max. ES is listed in the average category, and CS is listed in the below average category [30]. Both ES and CS groups are up to the average fitness level, and the general population values is set at 35.2 (mL/MN/kg), [31]. Based on BMI and WC, as measures of obesity, we recorded a reduction in BMI values relative to WC values (i.e., 2 cm for ES and 1 cm for CS). These results are associated with a decrease in a 1-mile walking time.

McDougal et al. suggest the decrease in BMI and WC correspond to the enhancement in 1-mile walk time performance [32]. Walking as a dynamic sports activity helps decrease lipid storage using femoral depot [33]. Similar studies indicate that walking helps increase aerobic capacity and decrease body fat [34]. Thus, it is strongly recommended to make walking an essential part of a successful weight loss program. Walking allows reducing body weight by 2–5% [35]. Based on an independent t-test and paired samples, this study demonstrated significant benefits of walking for the ES group. These results were found to be significant in the post-test. Similar studies confirm that high-intensity interval training methods can help reduce fat content in overweight people [36]. Results of O'Sullivan et al. can be used as a reference guide for walking. The researchers suggest to starting with a self-selected comfortable speed and then increase the speed to fast walking [37]. Thompson et al. [38] recommend walking as fast as possible to activate insulin switch, reverse insulin resistance, lose weight and prevent diabetes.

Table 2 and Fig. 1 present the results from the studies that address the influence of walking intensity on weight loss after childbirth.

Table 2. Results from the studies that address the influence of walking intensity on weight loss after childbirth

Variables	Sample	No.	Mean±SD	T		Shapiro-Wilk	
				V	P	V	P
1-MILE (MN)	ES	19	12.36±0.83	-2.33	0.01	-0.64**	0.96
	CS	20	13.25±1.51				
BMI (kg/m <sup>2</sup> )	ES	19	26.49±0.91	-2.25	0.03	0.62**	0.51
	CS	20	27.39±1.50				
VO <sub>2</sub> max (ml/MN/kg)	ES	19	39.40±1.73	-2.22	0.03	0.72**	0.64
	CS	20	36.87±2.48				
WC (Cm)	ES	19	110.07±3.31	-2.07	0.04	0.88**	0.89
	CS	20	112.83±4.84				

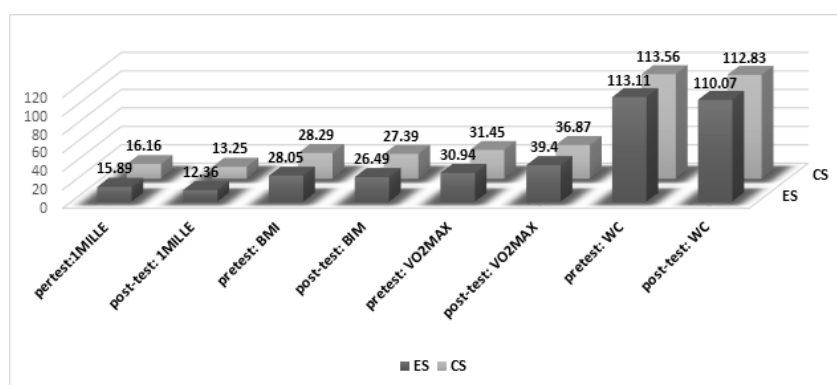


Fig 1. Results from the studies that address the influence of walking intensity on weight loss after childbirth

## DISCUSSION

Our research examines the effects of walking intensity on weight loss after childbirth. Pregnant and postpartum women experience significant short-term and long-term challenges [39] including physical changes and medical complications [40]. Several studies have shown that excess weight after pregnancy is associated with excess weight gain [41]. Walking intervention programs, particularly shorter ones, have little or no effect on improving or maintaining body mass and fat mass at the hip and the spine [42]. In addition, these programs have a low effect on weight loss [43]. Similar studies confirm that the more women walk, the less weight gain they have [3, 28]. Our study proves the benefits of walking for the ES group to achieve more weight loss. In addition, intensive walking increases aerobic capacity due to the increase in anaerobic fitness, which is associated with skeletal muscle adaptation (oxidative and glycolysis) [36]. This is accompanied by the improvement in maximal oxygen uptake and endurance performance [44]. Previous studies have shown that walking improves cardiorespiratory fitness and reduces side effects of sex hormones in obese women [45]. Similar to the other studies, our results confirm that walking enhances cardiovascular fitness and results in substantial health benefits to improve the quality of life, social well-being and general health [46]. High-intensity interval training is an efficient approach for developing cardiovascular fitness [47]. The abovementioned information confirms our assumptions and our results. Fast walking burns twice the amount

of calories compared with slow walking [48]. The results of both groups (ES and CS) confirm that walking is the preferred exercise for people who need to increase their physical activity as part of their overall strategy for sustainable weight loss [49]. However, based on the results of the ES group, we support the hypothesis that high intensity is needed to reach a sufficiently high target heart rate to achieve the best fat burning [50].

## CONCLUSIONS

This study showed that high intensity walking for extended periods of time burns more calories due to the energy expenditure balance, which is correlated with higher oxygen debt and the working metabolic rate compared with the resting metabolic rate. Our approach includes a speed phase, which is associated with a positive active recovery, as a beneficial method for increasing the benefits of walking. Speed develops the anaerobic zone, just like the aerobic zone is developed via resistance training or cardiovascular interval training. Previous studies confirm that this approach is able to generate clinically meaningful weight loss results with only 15 minutes of exercise per day [51].

This study shows that intensive walking improves performance of postpartum women. Walking improves cardiac and respiratory fitness, decreases BMI and WC and helps resolve changes in a woman's body caused by pregnancy. Our approach can help postpartum women obtain a healthy body weight. In addition, walking as a daily physical activity can boost aerobic activity of large skeletal muscles, which provides many health benefits with minimal adverse effects [10].

## APPLICABLE CONCLUSIONS

- Walking is the preferred exercise for people who need to increase their physical activity as part of their overall strategy for sustainable weight loss.
- Fast walking and interval training help postpartum women achieve greater weight loss.

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