Effects of 12-Week Endurance Training on Time to Exhaustion in Postmenopausal Women with Obesity and Prediabetes

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Background

Prediabetes affects over 50% of postmenopausal women, and when combined with obesity, significantly increases the risk of cardiometabolic disease. In this population, obesity is associated with impaired glycemic control, reduced metabolic flexibility, and lower cardiorespiratory fitness, often reflected in reduced performance during VO_2 max testing. Together, these factors contribute to poorer overall health and elevated disease risk. Although exercise is widely recommended to improve metabolic health, very little research has specifically examined whether a structured 12-week endurance training program can improve time to exhaustion (TTE), a measure of maximal exercise performance in post menopausal women with obesity and prediabetes. As a result, it remains unclear whether endurance training (ET) meaningfully enhances maximal exercise capacity in this high-risk group.

Aims of Research

To determine whether a 12-week structured endurance training program improves (TTE) in postmenopausal women with obesity and prediabetes.

Hypothesis

We hypothesized that 12-weeks of endurance training would improve (TTE) during a VO_2 max test.

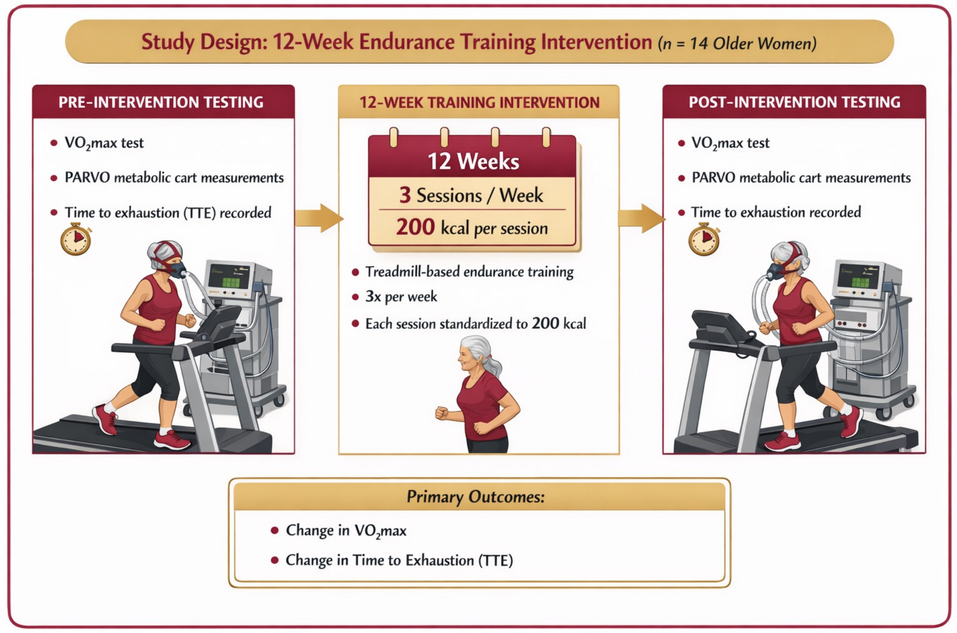
Participants

Participants were placed in 12-weeks of (ET) (n=14). Postmenopausal status was defined as cessation of menses for at least 5 years. All protocols have been approved by the Florida State University Institutional Review Board.

Participant Characteristics	Endurance Trained Group (n=14)
Age (Years)	60 ± 5
BMI (kg/m2)	34.1 ± 4

Research Design

Figure 1. Study measurements were collected prior to (PRE) and following (POST) a 12-week endurance training intervention. Participants completed three treadmill-based training sessions per week, with each session designed to expend approximately 200 kcal. Aerobic capacity was evaluated using a VO_2max treadmill test, with oxygen consumption measured via a PARVO Medics TrueOne 2400 metabolic cart. Time to exhaustion (TTE) was recorded during both PRE and POST VO_2max tests to assess changes in maximal exercise performance. Participants completed a graded exercise test with 2 minute stages. The test starts at 2.5 mph and remains constant. Percent incline changed by 2% at the end of each stage. Participants were asked to go until volitational exhaustion where the test would then be concluded and peak VO_2 and TTE were recorded.



Results

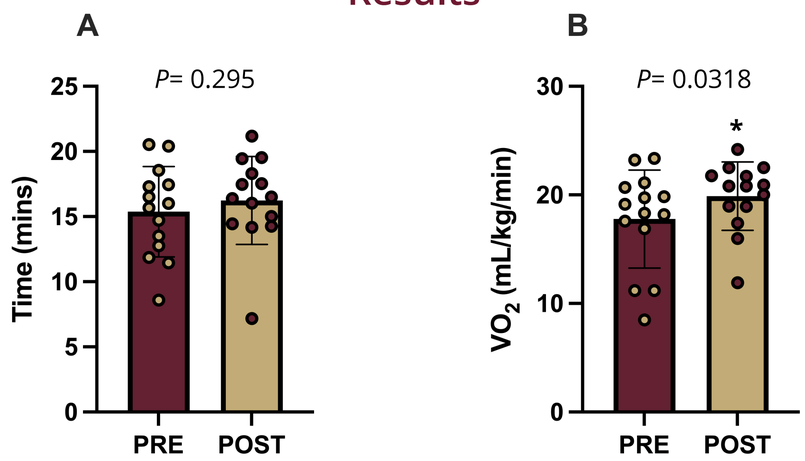


Figure 2. TTE before (PRE) and after (POST). Although TTE increased post-training, the change was not statistically significant (P= 0.295)
Figure 3. VO_2max before (PRE) and after (POST). VO_2max significantly increased following training (P= 0.0318).
(*) Indicates a statistically significant difference between (PRE) and (POST) values (p< 0.05)

Discussion

- 12 weeks of endurance training was associated with a small increase in (TTE), but the change did not reach statistical significance.
- Endurance training is known to improve cardiovascular fitness and VO_2max.
- However, its effect on maximal exercise performance during a VO_2max test in postmenopausal women with obesity and prediabetes remains unclear.
- The lack of statistical significance may be influenced by the small sample size or variability within this high-risk population.

Conclusion

- Further research with a larger cohort is needed to determine whether endurance training meaningfully enhances maximal exercise capacity and contributes to improved cardiometabolic health in this group.
- Understanding these adaptations may provide insight into potential cardiometabolic health benefits in postmenopausal women with obesity and prediabetes.

Key References

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