Review content summary

This a systematic review of 28 randomized controlled trials (RCTs) (with 2632 participants) aimed to determine the effectiveness of the impact of exercise training on improving health in early postmenopausal women. Participants studied were: 50-65 year postmenopausal women. To be included, studies had: more than 25 participants and less than 35% drop outs and involved interventions of at least 8 weeks duration. Interventions described in this review included: all exercise modes, precriptions, and dietary counselling. Outcomes measured include: morphological (e.g., body weight, bone mineral density); musculoskeletal (e.g., muscle strength and endurance and flexibility); motor (e.g., balance and coordination); cardiorespiratory (e.g., O2 consumption and BP); and metabolic (e.g., glucose, cholesterol). Authors report that early postmenopausal women could benefit from combining 30 minutes of daily moderate walking in one to three sessions (i.e., 1 session of 30 minutes; 2 sessions, 15 minutes; 3 sessions, 10 minutes) with a resistance training programme twice a week.

Comments on this review's methodology

This is a methodologically strong systematic review. A focused clinical question was clearly identified. Appropriate inclusion criteria were used to guide the search. A comprehensive search was employed using health and sport databases; handsearching key relevant journals; searching own files; and consulting colleagues. The search was not limited by language. Primary studies were assessed for methodological quality using research design, data collection, follow-up/attrition rates, and data analysis. The methods were described in sufficient detail so as to allow replication and two reviewers were involved in quality appraisal. Any discrepancies in appraisal results were rectified by discussion. The results of this review were transparent. Results were not clearly presented in narrative form so as to allow for comparisons across studies. Heterogeneity was assessed. Appropriate analytical methods (fixed effects, random effects) were employed to enable the synthesis of study results.

Why this issue is of interest to public health

Women living with menopause are recommended to make healthy lifestyle choices, especially in respect to nutrition and exercise. The prevalence rate of osteoporosis for women over the age of 50 is approximately 25% and 50% for women over 70 years of age. The risk of osteoporosis is reduced through the maintenance of bone mass through physical activity and calcium supplementation in adulthood. Furthermore, physical activity reduces CVD risk by approximately one-third to a half compared with their sedentary/unfit counterparts. However, according to the Canadian Fitness and Lifestyle Research Institute, 48% of Canadian women are inactive, 25% moderately active, and 21% active. Effective interventions that increase the level of physical activity and specific components of exercise training regimes that will benefit the health of postmenopausal women need to be identified and incorporated into future public health policies and programs.

Evidence and implications

Evidence points are not in order of the strength of evidence

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<th>What's the evidence?</th>
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<td>1.1.1. Improved in 9 studies although effect sizes and 95% confidence intervals for studies not reported</td>
<td>1.1.1. Exercise alone should not be recommended for the reduction of body weight or fat among</td>
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1.1.2. Best results on body composition were observed in overweight participants who also used weight-reducing diets in combination with exercise training.

1.1.3. The most effective exercise components for decreased body fat involved:
   1.1.3.1. 30-60 minutes of walking or other aerobic exercise at 45-75% of V2max on 3-5 days/week for 15-52 weeks
   1.1.3.2. strength training with weight machines, 5 exercises with 80% of 1 repetition maximum (RM) with 8 repetitions and 3 sets 2x/week for 1 year.

1.2. Bone strength (bone mineral density or bone mineral content) (16 studies)
   1.2.1. Improvements were noted in bone strength in 12 studies although effect sizes and 95% confidence intervals were not reported.
   1.2.2. No changes in bone mineral density were noted in 3 studies using either of:
         1.2.2.1. 12 weeks of combined aerobic and resistance training
         1.2.2.2. 24 weeks of strength training
         1.2.2.3. repeating a single muscle exercise for 1-2 years
   1.2.3. Interventions from high quality studies with the most participants and positive outcomes included:
         1.2.3.1. aerobic training combined with resistance training
         1.2.3.2. high impact circuit training and aerobic dance
         1.2.3.3. high impact training combined with alendronic acid
         1.2.3.4. walking training

2. Musculoskeletal fitness
   2.1. Muscle strength and endurance (11 studies)
       2.1.1. Muscle strength improved in 9 studies although effect sizes and confidence intervals were not reported. In these studies, interventions included:
         2.1.1.1. strength training with weight machines
         2.1.1.2. combined resistance training with aerobic training
         2.1.1.3. a single resistance exercise
         2.1.1.4. high-impact circuit training with aerobic dance
         2.1.1.5. low-impact aerobic exercises
       2.1.2. Muscle strength did not improve in 2 studies. In these studies, interventions included:
         2.1.2.1. aerobic and resistance training for 72 weeks
         2.1.2.2. high impact jumps for 1 year
       2.1.3. HRT had a positive effect on muscle strength in 2 of 3 studies in which HRT use was included, reported, or used in the analysis
   2.2. Flexibility (5 studies)
       2.2.1. Flexibility was improved by 5-25% in 3 studies. In these studies, interventions included:
         2.2.1.1. aerobic dancing with stretching
         2.2.1.2. aerobic training combined with resistance training and stretching
         2.2.1.3. supervised exercise sessions that lasted approximately 60 minutes performed 3 days/week for 12-52 weeks
       2.2.2. Flexibility was not affected in 2 studies. In these studies, interventions included:
         2.2.2.1. combination of aerobic and resistance training for 1.5 years
         2.2.2.2. strength training including stretching for 2 years
         2.2.2.3. exercise sessions that were supervised 1 day/week

3. Motor fitness (i.e., balance and coordination) (6 studies)
3.1. Improvements in balance and coordination (absolute benefit increases) of 11% -20% were reported in 4 studies. In these studies interventions included:

- 3.1.1. strength training with weight machines, 5 exercises at 80% of 1RM with eight repetitions and three sets on 2 days/week for 1 year
- 3.1.2. 30 minutes of combined aerobic and resistance training on 3 days/week for 12 weeks
- 3.1.3. 50 jumps on 6 days/week for 1 year
- 3.1.4. high-impact jumping combined with low-impact exercises

3.2. Coordination did not improve in 2 studies.

4. Cardiorespiratory fitness

4.1. Maximal aerobic power (VO₂ max) (18 studies)

- 4.1.1. Improvements in VO₂ max (absolute benefit increase) ranging from 4% - 32% were noted in all but one study. Interventions included:
  - 4.1.1.1. walking (5 studies)
  - 4.1.1.2. walking and/or other aerobic training (6 studies)
  - 4.1.1.3. aerobic exercise combined with resistance training/strength training (7 studies)
  - 4.1.1.4. mean prescribed exercise intensities of 68% of VO₂ max

4.2. Blood pressure (7 studies)

- 4.2.1. No intervention effect was noted in
  - 4.2.1.1.4. studies with normotensive participants with walking training alone or other aerobic training did not cause improvements in BP
  - 4.2.1.2. 1 study with mildly overweight (mean BMI 26 kg/m²) and hypertensive (BP <190/100 mm Hg) participants with interventions involving diet, walking and jogging of 16 km/week for 1 year
  - 4.2.1.3. 1 study with normotensive participants whose intervention involved walking at 55% or 45% of VO₂ max

- 4.2.2. Positive intervention effects were noted in
  - 4.2.2.1. diastolic blood pressure (decreased by 3 mm Hg) in 1 study with normotensive subjects involving 15 weeks of walking 5 days/week for 30–60 minutes in 1-2 exercise bouts at 65% of VO₂ max
  - 4.2.2.2. 1 study with hypertensive and overweight participants although an effect size and confidence interval was not reported.

5. Metabolic fitness

5.1. Blood lipids (9 studies)

- 5.1.1. A positive treatment effect was noted in 4 studies in which the intervention involved:
  - 5.1.1.1. combining a weight reducing diet or HRT with exercise in overweight or dyslipidemic participants
  - 5.1.1.2. 12 weeks to 2 years of aerobic exercise for 30-60 minutes at 60-70% VO₂ max on 3 days/week or
  - 5.1.1.3. aerobic training combined with resistance training

- 5.1.2. No improvements were noted in lipid levels in 5 studies. In these studies
  - 5.1.2.1. participants had normal lipid levels and BMIs ranging from 24-27
  - 5.1.2.2. training was similar to those interventions associated with positive effects

5.2. Blood glucose (2 studies) and insulin (1 study)

- 5.2.1. Exercise was effective in improving blood glucose levels in one study. In this study, interventions involved
  - 5.2.1.1. walking at 65% of VO₂max for 30–60 minutes

3.1. Programs aimed at improving balance and coordination among postmenopausal women should involve:

- 3.1.1. combined high and low-impact aerobic exercises, resistance training, and strength training on weight machines

3.2. Due to the limited number of studies, additional research is required to determine the effectiveness and optimal dose of exercise to promote flexibility with this population.

4. Cardiorespiratory fitness

4.1. Programs aimed at improving cardiovascular fitness among postmenopausal women should involve walking and/or other aerobic activity and possibly resistance training.

4.2. These programs may be more effective among overweight hypertensive postmenopausal women, however more research is required to identify specific subpopulations that experience the greatest effect.

5. Metabolic fitness

5.1. Blood lipids

- 5.1.1. Exercise appears to result in improvements in the lipid profile of overweight or dyslipidemic participants but not to those with healthy weights and normal lipid levels

5.2. Blood glucose and insulin

- 5.2.1. Due to the limited number of studies, additional research is required to determine the effectiveness and optimal dose of exercise to improve blood glucose and insulin levels with this population.
in one or two exercise bouts for 5 days/week for 15 weeks

5.2.1.2. controlled brisk intensity aerobic activity
5.2.2. Exercise did not impact insulin levels

6. Methodological Issues with the Primary Studies in the Review
6.1. Statistical significance was not reported for any of the outcomes in this review
6.2. Many of the interventions may not have been of sufficient dose (intensity, frequency, duration) to detect statistically significant intervention effects
6.3. Random allocation and blinding procedures were not reported in many studies
6.4. Drop out rates may have impacted the findings
6.5. Validity of outcomes measures is a concern in these studies as well as the consistent use of outcomes measures

6. Implications for Future Research
6.1. Research in this field must describe in greater details the procedures used for randomizing participants and groups to intervention and control groups, while ensuring rigorous procedures for the randomization and concealment of randomization occurs.
6.2. Sufficient details of the findings of studies must be reported including effect estimates and 95% confidence intervals.
6.3. Research must focus on the optimal dose of interventions particularly with respect to intensity, frequency and duration of interventions.
6.4. Future research needs to report fully on the study dropouts and reasons for drop-outs while ensuring as high a completion rate as possible.
6.5. Considerably more research is needed to develop and pilot test objective outcome measures and these measures then need to be utilized more consistently in future studies

7. Cost Benefit or Cost-effectiveness Information
7.1. No cost related information was included in the review

7. Cost Benefit or Cost-effectiveness Information
7.1. Future research should assess cost benefit or cost-effectiveness of the interventions

General Implications
- Fitness levels in early postmenopausal women can be improved through 30 minutes of daily moderate walking in one to three bouts combined with a resistance training program at least twice a week
- Additional high quality research is required to determine the effectiveness and optimal dose of exercise on various components of fitness among this population

Legend: CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk
**for definitions see the healthevidence.org glossary http://www.healthevidence.org/glossary.aspx

References used to outline issue

Other quality reviews on this topic

Related links
- The Health of Senior Women, Health Canada http://www.hc-sc.gc.ca/hl-vs/pubs/women-femmes/seniors-aines_e.html
Suggested citation

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