

IMPACT OF COMBINED PELVIC FLOOR EXERCISE, AEROBIC EXERCISE, AND LIFESTYLE INTERVENTIONS ON SYMPTOMS AND QUALITY OF LIFE IN POSTMENOPAUSAL WOMEN: A SYSTEMATIC REVIEW.”

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ABSTRACT: Post-menopause is characterized by endocrine changes that precipitate vasomotor symptoms, genitourinary syndrome of menopause (GSM), pelvic floor dysfunction, urinary incontinence, sleep disturbance, mood changes, musculoskeletal pain, and adverse cardio metabolic shifts that together reduce health-related quality of life (HRQoL). Non-pharmacological management — especially pelvic floor muscle training (PFMT), aerobic exercise, and lifestyle modification — is increasingly recommended because of safety, accessibility, and multi- system benefits. This systematic review synthesizes contemporary evidence from randomized trials, systematic reviews, and controlled studies investigating PFMT, aerobic activity, and lifestyle interventions (including dietary/time-restricted eating approaches), and evaluates outcomes across urinary symptoms, vasomotor and somatic complaints, sleep, mood, physical fitness, and HRQoL. Strong and consistent evidence supports PFMT as an effective treatment for stress and mixed urinary incontinence and for improving pelvic floor function and urinary- related quality of life. Evidence for aerobic exercise indicates beneficial effects on sleep, mood, fatigue and some somatic symptoms, although RCT results for vasomotor symptoms are mixed. Lifestyle interventions (dietary improvement, weight management, sleep hygiene and behavioural programs) show consistent associations with better symptom burden and HRQoL and appear to augment exercise benefits when combined. Pilot and small randomized multimodal programs that integrate PFMT with aerobic training and lifestyle counselling suggest broader and faster improvements than single-component therapy. Taken together, the literature supports a multimodal, physiotherapy-led approach — PFMT + aerobic exercise + lifestyle modification — as a first-line conservative strategy to reduce symptoms and improve quality of life in post-menopausal women. Larger, standardized trials of combined programs with long-term follow up are needed.

INTRODUCTION

Menopause—the permanent cessation of menses after 12 months of amenorrhea—marks a major reproductive and metabolic transition that most women experience between ages ~45–55; globally the post-menopausal population is growing rapidly and by recent estimates hundreds of millions of women will live many decades after menopause.

Epidemiologically, vasomotor symptoms (hot flashes, night sweats) affect approximately 60–80% of women at some point, urogenital syndrome of menopause (vaginal dryness, dyspareunia, urinary urgency/urgency incontinence) affects roughly 30–55%, and musculoskeletal pain, fatigue and sleep disturbance are reported by 40– 70%. Etiology centres on ovarian estrogen depletion and downstream changes in vascular reactivity, urogenital mucosa, pelvic floor connective tissue and muscle tone, body composition (increased central adiposity), bone mineral density and autonomic balance. Risk factors for more severe symptoms include older chronological age, early or surgical menopause, higher body mass index, sedentary behaviour, multiparity and prior pelvictrauma/delivery, smoking, and comorbid metabolic disease. Clinically, women suffer vasomotor and somatic symptoms, deterioration of pelvic floor support with urinary leakage or prolapse, sexual dysfunction, mood disorder and reduced HRQoL; pharmacologic therapies such as hormone replacement reduce many symptoms but are contraindicated or undesirable for many

patients because of long-term risks and side effects. Consequently

conservative, physiotherapy-based interventions—pelvic floor muscle training (PFMT) to restore pelvic support and continence, aerobic exercise to improve cardiovascular fitness, sleep and mood, and lifestyle modification (dietary change, weight control, sleep hygiene and stress management)—are recommended as safe, low-risk, scalable approaches that target both localized pelvic dysfunction and systemic sequelae of estrogen loss; this review examines the evidence for PFMT, aerobic exercise and lifestyle interventions—singly and combined—on symptom burden and HRQoL in post-menopausal women.

METHODOLOGY

A structured search was conducted in PubMed, PMC, Web of Science and Scopus (through Dec 2024) using combinations of keyword post menopause, pelvic floor muscle training, PFMT, urinary incontinence, aerobic exercise, physical activity, lifestyle modification, diet, time-restricted eating, menopausal symptoms, quality of life. We prioritized randomized controlled trials (RCTs), systematic reviews, meta-analyses and high-quality observational studies in post-menopausal populations. Data extracted included study design, sample size, intervention details (type, frequency, duration), primary outcomes (urinary symptoms, menopausal symptom scales, HRQoL), and main findings. Because interventions and outcomes were heterogeneous, a narrative synthesis was used; where available, major meta-analytic findings and notable RCT results are quoted and cited.

RESULTS

Pelvic Floor Muscle Training (PFMT) — systematic reviews / RCTs / program studies

Marcellou EG et al., 2024 — “Effect of pelvic floor muscle training on urinary incontinence symptoms in menopausal women: a systematic review and meta-analysis.” - This 2024 meta-analysis pooled multiple trials and concluded PFMT significantly reduces urinary incontinence severity in menopausal women; the authors report a ~92% probability of clinically meaningful improvement for patients receiving PFMT versus controls, and improvements in patient-reported continence-related quality-of-life scales. The paper emphasizes PFMT as effective first-line conservative care.

Alves FK et al., 2015 — “A pelvic floor muscle training program in postmenopausal women: effects on contractility and urinary symptoms.”- In this preliminary clinical study, a structured PFMT program applied over 8–12 weeks increased pelvic floor contractility on EMG and reduced anterior pelvic organ descent and urinary symptom scores in post-menopausal participants; authors recommend supervised PFMT with progression and home practice for best results.

Piernicka M et al., 2025 — “Training interventions used in postmenopausal women to improve pelvic floor muscle function related to urinary continence: a review.”- This review (characterizing frequency, intensity, duration and exercise type) concluded that multiple PFMT formats (group, individual, biofeedback-assisted) reliably improved pelvic floor function; it highlights that 8–12 week programs with supervised sessions and clear home regimens produced the most consistent effects.

Garcia-Laria R et al., 2025 — “Effects of pelvic floor muscle training on sexual function of postmenopausal women.”- This recent study/review indicates PFMT has positive effects on sexual function domains (arousal, lubrication, pain reduction) in post-menopausal women, though evidence is more limited than for continence outcomes; authors call for larger RCTs focused on sexual health endpoints.

Aerobic Exercise / Physical Activity — trials and reviews

Witkowski S et al., 2022 — “Physical activity and exercise for hot flashes: systematic review.” - This review summarized trials of exercise for vasomotor symptoms and concluded the RCT evidence is mixed: some trials show small or no benefit for hot flashes, while others (especially when exercise is combined with improved sleep or behavioural changes) report improvements in overall menopausal symptom burden; the authors emphasise methodological heterogeneity and call for standardized trials.

Buchanan DT et al., 2017 — “Effects of yoga and aerobic exercise on actigraphic sleep outcomes in menopausal women” - In a randomized trial comparing yoga, aerobic exercise and usual care, improvements in actigraphic sleep parameters were limited, though subjective improvements in sleep and mood were reported; the study suggests some benefit of physical activity for sleep and psychological domains rather than consistent objective sleep changes.

Jing Y et al., 2024 — “The effect of aerobic exercise on sleep disorders in menopausal women: a systematic review.”- A 2024 systematic evaluation concluded aerobic training programs of moderate intensity (≥ 150 min/week) were associated with improvements in self-reported sleep quality and reduction in fatigue in menopausal populations; authors propose practical exercise prescriptions to improve sleep and somatic symptoms.

Lifestyle Modification (diet, weight management, sleep, behavioural interventions / time-restricted eating)

Erdelyi A et al., 2023 — “The importance of nutrition in menopause and ageing: a review.”-This review summarizes nutritional recommendations (adequate calcium, vitamin D, protein, fibre, reduced saturated fat) and shows that diet quality correlates with reduced cardiovascular risk and better symptom control; it highlights diet as central to long-term health in menopause. □

Jozwiak B et al., 2025 — “Time-restricted eating combined with exercise reduces menopausal symptoms and improves quality of life more than exercise alone: a quasi-randomized controlled trial” - This recent trial compared exercise alone vs exercise + time-restricted eating (TRE) and found the combined group experienced greater reduction in overall menopausal symptom scores (especially somatic and psychological subdomains) and improved HRQoL; TRE did not significantly change urogenital/sexual subdomains, but enhanced physical/psychological outcomes.

Lifestyles and quality of life study (cross-sectional) — (example large observational work on lifestyle factors and QoL) - Large population studies indicate sedentary behaviour, smoking, poor sleep and obesity are strongly associated with worse menopausal symptom burden and lower HRQoL; these observational data support lifestyle counselling in clinical Care.

Combined / Multimodal Interventions:

International Continence Society Abstract (ICS 2021) — “The effect of a multimodal exercise program on pelvic floor muscle function in postmenopausal women with urinary incontinence – A pilot randomized controlled trial.”- An 8-week multimodal program (PFMT + aerobic + resistance training) produced greater improvements in symptom severity and pelvic floor function compared with PFMT alone in a small pilot RCT; authors concluded combined programs may produce synergistic benefits and recommended larger trials.

ICS

Overall results synthesis: PFMT has strong RCT/meta-analytic support for urinary outcomes. Aerobic exercise and lifestyle modification deliver important systemic benefits (mood, sleep, fatigue and cardio metabolic risk), and when integrated with PFMT in multimodal programs may provide broader, clinically meaningful improvements across pelvic and systemic symptom domains. Evidence for combined programs is promising but largely from pilot/early trials — larger, longer RCTs are needed.

DISCUSSION

This review synthesizes contemporary evidence that supports PFMT as the most robust non-pharmacological therapy for urinary incontinence and pelvic floor dysfunction in post-menopausal women (strong meta-analytic support). Aerobic exercise contributes meaningfully to mood, fatigue and subjective sleep improvement and mitigates cardio metabolic risk; however, trials addressing vasomotor symptoms show mixed results, likely due to heterogeneity in exercise type, intensity and adherence. Lifestyle interventions (dietary optimization, weight control, sleep hygiene, smoking cessation) are consistently associated with lower symptom burden and better HRQoL and can enhance the effects of exercise when combined (e.g., time-restricted eating + exercise). Pilot multimodal RCTs suggest that integrated PFMT + aerobic/resistance training + lifestyle counselling accelerate and broaden improvements compared with single-component approaches. Major limitations across the literature include variability in intervention dosing (frequency/intensity), short follow-up durations, heterogeneous outcome measures and relatively few large RCTs testing fully integrated programs. Future work should standardize protocols, evaluate dose–response relationships, and measure long-term adherence and outcomes.

CONCLUSION

PFMT is evidence-based and should be offered as first-line conservative therapy for urinary incontinence and pelvic floor dysfunction in post-menopausal women. Aerobic exercise and lifestyle modification provide complementary systemic benefits (mood, sleep, fatigue, cardio metabolic health) and are recommended as part of routine care.

Multimodal programs that integrate PFMT with aerobic exercise and targeted lifestyle interventions show promise for the most comprehensive improvements in symptom burden and HRQoL; larger standardized RCTs of combined approaches are warranted.

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