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RESEARCH LETTER
Heart failure

Importance of health-related quality of gain with exercise training in preserved ejection fraction heart failure

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We read the study of Baral *et al* with great interest.[1] The authors are to be congratulated on this well-conducted systematic review and meta-analysis of randomized trials assessing the impact of exercise in people with heart failure with preserved ejection fraction (HFpEF).

Given the limited availability of evidence-based interventions for HFpEF, confirmation of the benefits of exercise training in this population is an important finding. The authors report a pooled improvement in overall Minnesota Living with Heart Failure (WLwHF) questionnaire score of −12.06 (95% CI: −17.11 to −7.01) with participation in exercise training compared to control. Not only a statistically significant improvement in health-related quality of life (HRQoL), but we would also note, that this is a clinically important one, i.e. exceeds the minimal important clinical difference for the MLwHF of −5.00.[2]

As recently highlighted by the intriguingly entitled editorial: 'I don't wanna live forever'- *importance of quality of life in heart failure patients*, HRQoL is now a recognized key target for heart failure disease management alongside the traditional focus of drugs and medical devices on reducing hospitalization and mortality.[3] The European Association of Preventive Cardiology recently published their consensus paper on HRQoL[4] and in 2020 the US Food and Drug Administration accepted the disease-specific HRQoL measure, Kansas City Living with Cardiomyopathy (KCCQ) as outcome that can be used in drug approval for heart failure.[5]

Building on this publication by Baral *et al*., we would like to share our findings of impact of exercise training in HFpEF across a range of HRQoL measures based on our systematic review and meta-analysis (see *Table 1*). Our review searched a number of bibliographic databases

Table 1 Impact of exercise-based on HRQoL—meta-analysis of randomized trials in HFpEF

HRQoL outcome	*n* studies (*n* patients)	Pooled result (WMD, 95% CI)[a]	Statistical heterogeneity I^2 statistic (%)
WLwHF total	9 (495)	−6.89 (−12.49 to −1.28)[b]	73.8
WLwHF physical subscale	6 (360)	−2.98 (−6.35 to 0.39)[b]	73.1
WLwHF mental subscale	6 (359)	−1.30 (−4.47 to 1.87)[b]	92.2
KCCQ overall summary score	3 (411)	5.34 (1.75 to 8.93)[c]	20.4
SF-36 Physical component score	4 (282)	1.99 (0.17 to 3.81)[c]	30.4
SF-36 Mental health component score	3 (190)	1.32 (−6.54 to 9.19)[b]	79.7
EQ-5D	1 (176)	9 (3 to 16)	Not applicable

WMD, weighted mean difference; KCCQ, Kansas City Cardiomyopathy Questionnaire; MLwHF, Minnesota Living with Heart Failure questionnaire; EQ-5D, EuroQoL; SF-36, Short-Form-36.
[a]Meta-analysis on based on a systematic review of randomized controlled trials of exercise-based cardiac rehabilitation for people with HFpEF.
[b]Random effect meta-analysis model.
[c]Fixed effect meta-analysis model.

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(Medline, Embase, Web of Science, Cumulative Index of Nursing and Allied Health Literature, Cochrane Library Central, China National Knowledge Infrastructure database) up to April 2024. We included studies if they: (i) included adults diagnosed with HFpEF (LVEF ≥ 45%); (ii) performed exercise-based cardiac interventions group; (iii) had a comparison group not receiving exercise; (iv) included an HRQoL outcome; and (v) randomized controlled with follow-up 12 weeks.

Whilst based on a slightly different group of included randomized trials (we excluded four trials of the Baral review as these used either functional electrical stimulation—small electrical impulses to activate muscles—or inspiratory muscle training—a form of resistance training which strengthens the muscles used for breathing), our results are consistent with those of Baral and colleagues. We confirm a statistically and clinically important improvement in mean total MLwHF questionnaire score (−6.89, 95% CI: −12.49 to −1.28). Importantly our analyses also show improvement in the other HRQoL measures with exercise training in HFpEF. This includes a significant improvement the disease-specific measure of KCCQ and the generic HRQoL measures of the physical component of the SF-36 and the EQ-5D. However, high levels statistical heterogeneity (I^2 statistic >50%) in pooled MLwHF highlight the need for caution in direct application of these results to practice and policy. Likely causes of this heterogeneity were the variation in types and intensity of exercise intervention and population characteristics (e.g. mean age, gender distribution) across included studies.

In summary, our pooled analyses of randomized trials are supportive of importance of exercise training in HFpEF in terms of improved HRQoL. Our findings are novel in that show this benefit to be consistent across both disease-specific [MLwHF & Kansa City Cardiomyopathy Questionnaire (KCCQ)] and generic HRQoL outcomes [EuroQoL (EQ-5D & Short-Form-36 (SF-36)]. However, like Baral and colleagues, we highlight the need for these meta-analyses to be updated with larger trials and longer follow up, including two ongoing trials of the Diastolic Heart Failure and Rehabilitation EnAblement in CHronic Heart Failure in HFpEF (REACH-HFpEF) trials.[6,7] To enable their comparison and facilitate evidence syntheses, trials should seek to consistently collect and report outcomes that include both disease-specific and generic HRQoL measures.

Data availability

These data presented in this publication will be submitted for full publication.

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References

1. Baral R, Ho JSY, Soroya AN, Hanger M, Clarke RE, Memon SF, Glatzel H, Ahmad M, Providencia R, Bray JJH, D'Ascenzo F. Exercise training improves exercise capacity and quality of life in heart failure with preserved ejection fraction: a systematic review and meta-analysis of randomized controlled trials. *Eur Heart J Open* 2024;**4**:oeae033.
2. American Thoracic Society. *Minnesota Living with Heart Failure Questionnaire*. New York: American Thoracic Society; 2004. http://qol.thoracic.org/sections/instruments/ko/pages/MLWHFq.html.
3. Schmid J-P. 'I don't wanna live forever'- importance of quality of life in heart failure patients. *Eur J Prevent Cardiol*. 2024;**31**:1425–1426.
4. Volterrani M, Halasz G, Adamopoulos S, Agostoni PG, Butler J, Coats AJS, Cohen-Solal A, Doehner W, Filippatos G, Jankowska E, Lam CSP, Lambrinou E, Lund LH, Rosano G, Metra M, Paolillo S, Filardi PP, Rakisheva A, Savarese G, Seferovic P, Tocchetti CG, Piepoli M. Quality of life in heart failure. The heart of the matter. A scientific statement of the Heart Failure Association and the European Association of Preventive Cardiology of the European Society of Cardiology. *Eur J Prevent Cardiol* 2024. https://doi.org/10.1093/eurjpc/zwad400
5. US Food and Drug Administration (FDA). DDT COA #000084: Kansas City Cardiomyopathy Questionnaire (KCCQ). https://www.fda.gov/drugs/clinical-outcome-assessment-coa-qualification-program/ddt-coa-000084-kansas-city-cardiomyopathy-questionnaire-kccq (15 September 2025).
6. Edelmann F, Bobenko A, Gelbrich G, Hasenfuss G, Herrmann-Lingen C, Duvinage A, Schwarz S, Mende M, Prettin C, Trippel T, Lindhorst R, Morris D, Pieske-Kraigher E, Nolte K, Düngen H-D, Wachter R, Halle M, Pieske B. Exercise training in Diastolic Heart Failure (Ex-DHF): rationale and design of a multicentre, prospective, randomized, controlled, parallel group trial. *Eur J Heart Fail* 2017;**19**:1067–1074.
7. Lang CC, Smith K, Wingham J, Eyre V, Greaves CJ, Warren FC, Green C, Jolly K, Davis RC, Doherty PJ, Miles J, Britten N, Abraham C, Van Lingen R, Singh SJ, Paul K, Hillsdon M, Sadler S, Hayward C, Dalal HM, Taylor RS; REACH-HF investigators. A randomised controlled trial of a facilitated home-based rehabilitation intervention in patients with heart failure with preserved ejection fraction and their caregivers: the REACH-HFpEF study. *BMJ Open* 2018;**8**:e019649.