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Effects of cardiac rehabilitation on the severity of angina, health-related quality of life, and exercise capacity among adults with microvascular angina: a systematic review and meta-analysis

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PURPOSE

To establish the effects of exercise-based cardiac rehabilitation on the severity of angina, health-related quality of life (HRQoL) and exercise capacity among adults with a diagnosis of microvascular angina compared to a no-exercise group.

METHODS

Standard Cochrane methodology was used. Searches were performed in 14 online databases. We included randomised controlled trials assessing the independent effect of cardiac rehabilitation versus a no-exercise group in adults with a probable or definite diagnosis of microvascular angina according to the COVADIS criteria.

RESULTS

Of the 15,873 reports identified, five studies (n=222) were included (Figure 1). Studies were judged to be at a 'some concerns' or 'high' risk of bias (Figure 2). Mean ages ranged from 51 to 64 years, and 97% were women. All the cardiac rehabilitation programmes utilised aerobic exercise; in addition, two studies used resistance training.

Meta-analysis of the effects of cardiac rehabilitation versus no-exercise on severity of angina (2 RCTs; n=85) was not possible due to the limited data presented in one of the reports. The narrative synthesis concluded that there is no evidence of an effect of cardiac rehabilitation on the severity of angina.

Meta-analysis of the effects of cardiac rehabilitation versus no-exercise on HRQoL were conducted at domain level of the Short Form-36 (SF-36) questionnaire (2 RCTs; n=75), and exercise capacity as measured by peak VO₂ (3 RCTs; n=101). The evidence of the effect of cardiac rehabilitation versus no-exercise intervention of the SF-36 domains meta-analysed was classified as 'very low certainty', meaning we have very little confidence in the effect estimates calculated.

Meta-analysis of the effects of cardiac rehabilitation versus no-exercise on exercise capacity was estimated to result in a SMD of 1.06 (95% CI -0.7 to 2.19, low certainty of evidence) for measurements of peak VO₂ in favour of cardiac rehabilitation. A SMD of 1.06 is estimated to be equivalent to a 4.16mL/kg/min change in peak VO₂, which is believed to represent a clinically meaningful difference.

CONCLUSIONS

CR may improve exercise capacity outcomes in patients with microvascular angina compared to controls, however our confidence in the effect estimates is limited. We remain uncertain as to the effect of cardiac rehabilitation on the severity of angina and HRQoL. High-quality, well-reported randomised control trials are needed to more rigorously assess the benefits and harms of cardiac rehabilitation for adults with microvascular angina.

Compared to usual care, cardiac rehabilitation may improve exercise capacity in patients with microvascular angina

	Outcome	Anticipated effect of intervention	Number of participants (and studies)	Certainty of the evidence (GRADE)	Comments
Health Related Quality of Life	SF-36 Physical role limitation	MD 22.38 higher (95% CI 0.64 to 44.13)	76 (2 RCTs)	⊕⊕⊕⊕ Very low	A change of 18.75 points in this domain is thought to represent a minimally clinically important difference (MCID).*
	SF-36 Emotional role limitation	MD 17.73 higher (95% CI 7.19 to 28.28)	76 (2 RCTs)	⊕⊕⊕⊕ Very low	A change of 16.7 points in this domain is thought to represent a MCID.*
	SF-36 Vitality	MD 14.14 higher (95% CI -4.95 to 33.23)	76 (2 RCTs)	⊕⊕⊕⊕ Very low	A change of 18.75 points on this domain is thought to represent a MCID.*
	SF-36 General Health	MD 14.46 higher (95% CI -1.91 to 30.82)	76 (2 RCTs)	⊕⊕⊕⊕ Very low	A change of 15 points on this domain is thought to represent a MCID.*
Exercise Capacity	Peak VO ₂ SMD	SMD 1.06 higher (95% CI -0.07 to 2.19) <i>A SMD of 1.06 is estimated to be equivalent to a 4.16mL/kg/min change in peak VO₂.</i>	101 (3 RCTs)	⊕⊕⊕⊕ Low	A change of 1mL/kg/min on Peak VO ₂ is thought to represent a MCID.*

* MCID based on studies in patients with cardiovascular disease.

Figure 1. PRISMA Flow diagram

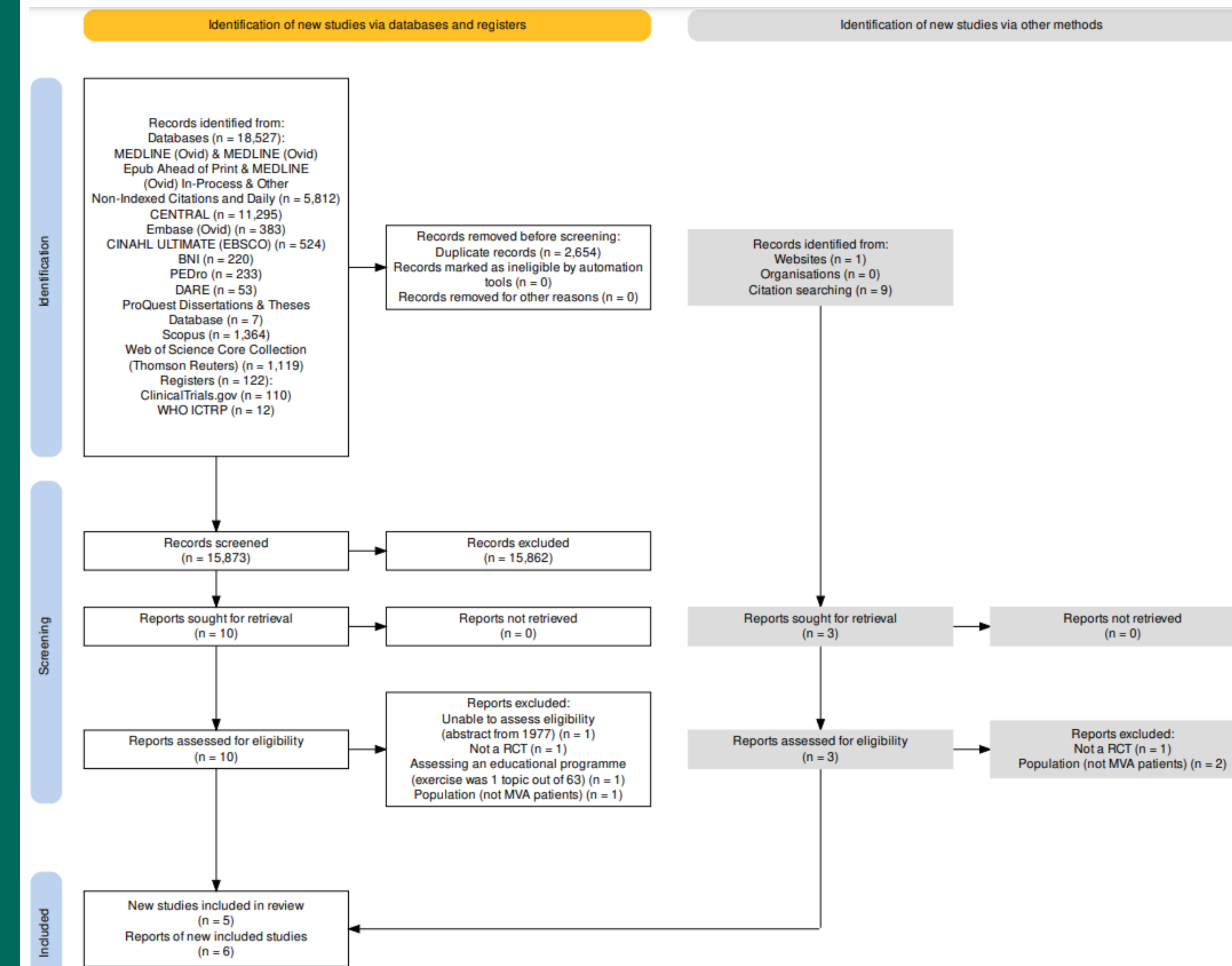


Figure 2. Risk of Bias

Study	Risk of bias domains					Overall
	D1	D2	D3	D4	D5	
Asbury 2008 - Severity of Angina	+	-	-	-	-	-
Feizi 2012 - Severity of Angina	-	-	?	?	?	-
Rahmani 2020 - Severity of Angina	+	-	+	-	-	-
Tyni-Lenne 2002 - HRQoL	-	-	-	-	-	-
Asbury 2008 - HRQoL	+	-	-	-	⊗	⊗
Feizi 2012 - HRQoL	-	-	+	-	⊗	⊗
Bove 2020 - HRQoL	+	-	⊗	-	-	⊗
Eriksson 2000 - Exercise capacity	-	-	-	+	-	-
Bove 2020 - Exercise capacity	+	-	⊗	+	-	⊗
Rahmani 2020 - Exercise capacity	+	-	+	+	-	-

Domains:
D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention.
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

Judgement
⊗ High
- Some concerns
+ Low
? No information
○ Not applicable

The authors declare no conflicts of interest.