

Systematic Review of Cardiac Rehabilitation Outcomes Studies following Acute Myocardial Infarction

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Introduction

It is believed that cardiac rehabilitation (CR) improves long term clinical outcomes in survivals after acute myocardial infarction (AMI). There are several systematic reviews (SR) on the impact of cardiac rehabilitation (CR) on outcomes in ischemic heart disease but most of them include old studies published before 2000 and there has been no SR on the impact of CR on post-discharge outcomes limited to survivors after AMI. The purpose of this study is to investigate the SR on the prognostic effect of CR on clinical outcomes in the modern era of AMI treatment.

Subjects and Methods

The key question was whether CR beneficial in improving post-discharge outcomes in survivors after AMI. Table 1. shows the contents of PICOTS-SD. Key words for searching strategies were 'myocardial infarction', 'percutaneous coronary intervention', 'angioplasty', 'stent', 'coronary artery bypass graft surgery', 'cardiac rehabilitation' and etc. Starting with the year 2000, the following bibliographic databases were used: Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, CINAHL, KoreaMed, and KMBASE. Two review authors independently screened all identified studies for inclusion and exclusion criteria. We assessed the evidence of the outcome measures of CR, which were all-cause mortality, cardiac related mortality, recurrence, re-admission, and repeat revascularization. When quantitative addition of studies was possible, meta-analysis was done and heterogeneity was verified, and when addition was not possible, quality compatibility evaluation was done.

Results

Out of the selected 14 studies, two were RCTs, and 12 were cohort studies. The publication year, number of participants, duration of follow up, and outcome measures are presented in Table 2. When meta-analysis was done on two RCTs with application of random effect model, all-cause mortality was lower in the CR group compared to the controlled although it was not statistically significant, and there was no difference between the two groups regarding re-hospitalization rates. In the 14 cohort studies, heterogeneity was high among studies regarding all-cause mortality, so qualitative addition was done instead of quantitative addition, and in all studies, mortality of CR group was reported to be lower than the control group. In the CR group, the rate of AMI recurrence and major adverse CV event (MACE) occurrence was significantly lower, and while the rate of repeat revascularization and re-admission was lower in the CR group, the difference was not statistically significant.

Conclusion

In this SR of studies on the prognosis of AMI patients after discharge, after year 2000, there was no difference between CR and the control group in mortality and re-admission rate in RCTs, but the CR group showed significantly lower mortality, recurrence, and MACE occurrence in cohort studies.

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Population	Survivals after AMI ¹ receiving PCI ² or CABG ³
Intervention	- Exercise-based cardiac rehabilitation
Comparisons	- Usual care (no exercise control)
Outcomes	- Primary outcome: mortality - Secondary outcome: MACE ⁴
Time	- Publication year: \geq 2000 - Follow up periods: at least one year
Setting	- No limitation
Study Design	- Randomized control trials - Cohort studies

1. Acute myocardial infarction, 2. Percutaneous coronary intervention, 3. Coronary artery bypass graft (CABG) 4. Major adverse cardiac event.

Table 1. PICOT-SD

Index	Design	Author (year)	No. of subjects	Follow up	Outcome index
1	RCT	Maroto (2005)	180	10yr	Mortality
2		West (2012)	1,813	1yr	Mortality, re-admission
3		Junger (2010)	4,547	1yr	Mortality, MACE [†]
4		Kim (2011)	161	1yr	Mortality, MACE
5		Rauch (2014)	3,560	4-12m	Mortality, MACE
6	Prospective cohort	Lewinter (2014)	EMMACE1: 1,324 EMMACE2: 1,975	1yr	Mortality
7		Coll-Fernandez (2014)	1,043	18m	Mortality, recurrence
8		Meurs (2015)	1,702	1yr	Mortality, re-admission
9		Pouche (2016)	2,894	5yr	Mortality
10		Kureshi (2016)	3,957	7yr	Mortality
11		Boulay (2004)	91	1yr	Re-admission, recurrence
12	Retrospective cohort	Nielsen (2008)	200	1yr	Mortality, MACE
13		Suaya (2009)	25,966	5yr	Mortality
14		Beauchamp (2012)	297	14yr	Mortality

† Major adverse cardiac event: re-admission, recurrence, repeat revascularization

Table 2. Baseline characteristics and overall results of Selected Studies