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The efficacy of exercise-based cardiac rehabilitation treatments in terms of relief from symptoms of anxiety and depression symptoms among patients with cardiac problem

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Abstract
Cardiac rehabilitation (CR) has been shown to provide the best social, psychological and physical conditions for patient recovery after myocardial infarction (MI). The aim of present study was to quantify the efficacy of exercise-based CR treatments in terms of relief from symptoms of anxiety and depression symptoms among patients with MI. Literature published up to August 2017 was reviewed systematically using relevant keywords, MeSH terms, and Emtree headings to search PubMed, Embase, CINAHL (Ebsco), Cochrane Central Register of Controlled Trials (CENTRAL) and Web of Science. The results of included studies were compared meta-analytically. We found that exercise-based CR had a significant effect on decreasing anxiety and depression scores. Furthermore, exercise-based CR may alleviate anxiety and depressive symptoms at different time periods. For patients with MI, exercise-based CR has been demonstrated to alleviate anxiety and depressive symptoms. These findings highlight CR as essential and beneficial for minimizing MI patient anxiety and depression during recovery.
Keywords: Cardiac rehabilitation , Anxiety , Depression, Myocardial infarction

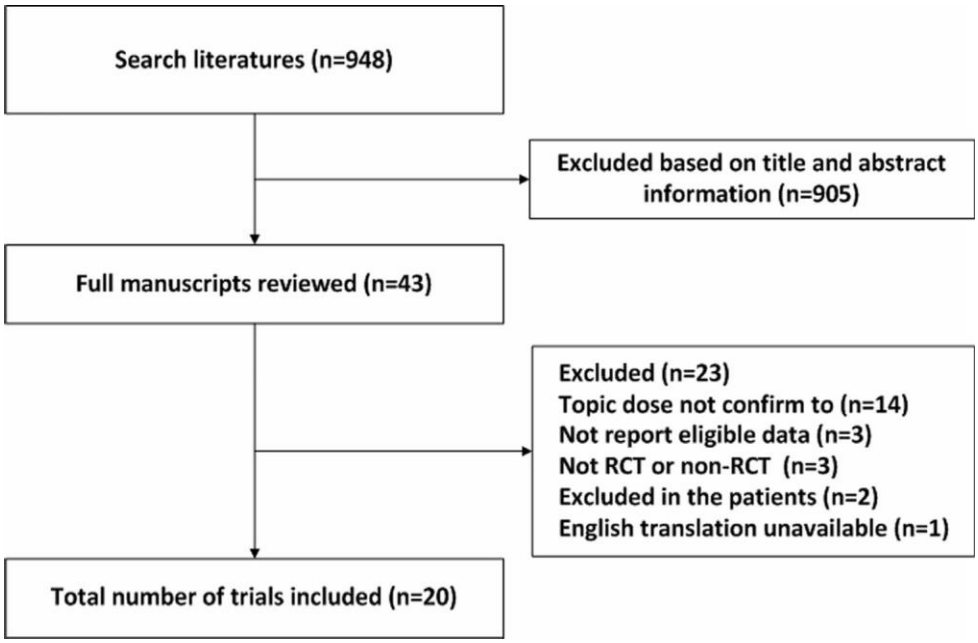
Introduction
Acute myocardial infarction (AMI) is a serious cardiovascular event that has an effect on the health-related quality of life (HRQoL) of both patients and their families due to intense cardiac disease progression and repeated readmissions to healthcare facilities(De Smedt , 2013). Notably, psychological symptoms, such as anxiety, depression, hostil- ity and so on, appear to negatively affect cardiac outcomes after AMI(Gaw-Ens ,1997). Akhtar et al. has shown that up to 50% patients with AMI have been found to suffer from symptoms of anxiety and/or depression one week after AMI(Akhtar,2004). Another prospective study revealed that the 12 month prevalence rates among 288 MI patients were 37.2% for depressive symptoms, 41.0% for anxious symptoms and 51% of patients had both anxiety and depression (Lane,2002). Anxiety also had a negative correlation with prognosis in post-MI patients(Rafael,2014). Patients with depressive symptoms after AMI have been found to have relatively lower levels of full time work and working hours(Soderman,2003). Moreover, psychological risk factors such as hostility, anger, anxiety, depression, have been shown to be a trigger for AMI and MI. Many studies have shown that post-MI patients with anxiety have higher rates of hospitalization (Frasure-Smith,1995). Large studies identified that post-MI depression, even minimal symptoms of depression, were significant risk factors for reinfarction and death (Schleifer , 1989). Large studies identified that post-MI depression, even minimal symptoms of depression, were significant risk factors for reinfarction and death(Schleifer,1989). Finally, a meta-analysis has proposed that the odds ratio of post-MI with depression leading to mortality was 2- to 2.5-fold greater than without depression(van Melle , 2004). The significance of curing anxiety and depression in patients with MI should not be understated. Fortunately, reducing psychological discomfort also has the potential benefit on long-term mental health status and outcomes for post-MI patients(Cossette,2001). Many randomized and non-randomized controlled trials have addressed the positive effects of exercise-based cardiac rehabilitation (CR) on anxiety and depression with AMI patients(Cossette,2001). Articles from the search results were included if the following conditions were met: (1) study design consisted of an intervention study (RCT

or non-RCT); (2) the outcomes included anxiety and/or depression; (3) all participants experienced AMI, including percuta- neous coronary intervention (PCI) or coronary artery bypass graft sur- gery (CABG); (4) the trial intervention was exercise-based cardiac rehabilitation. We excluded articles that were not written in English. Moreover, this meta-analysis and systematic reviews was conducted and reported in accordance with Meta-Analysis of Observational Studies in Epidemiology (MOOSE) statements and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). This study was registered at International Prospective Reg- ister of Systematic Reviews(Rafael,2014).

Tables and Figures

Our preliminary online search identified 948 studies, after reading the titles and abstracts, 905 were excluded because the articles did not meet our inclusion criteria. After reading full manuscripts, 20 articles were eligible to be included in the meta-analysis and systematic review. In total, 1828 MI patients were included in this analysis, including 233 patients who underwent CABG, and the number of patients per studies ranged from 16 to 201. A flowchart representing study selection was shown in Fig. 1.

Fig. 1. Flow chart of the study extraction and selection process for meta-analysis.



These 20 articles included nine RCTs and two non-RCTs; five studies were based in Japan, two each in Canada, China, Italy, and US, and one in Taiwan (China), UK, Netherlands, Singapore, Iran, Scotland, and Poland, respectively. Follow-up time was different from hospital discharge to two years among studies. The mean age of participant ranged from 52 to 68.5 years. The percentage of women in the patient population was low except for the study by Mayou et al. The type of intervention studied in an overwhelming majority of cases was exercise-based CR and/or standard of care. Detailed information about each study is shown in Table 1

Table 1. Summary of study characteristics

Study	Methods	Cardiac Population	Type of intervention	Number	Age(years)	Women (%)	Follow-up (weeks)
Dixhoorn et al. (1990)	RCT	MI	exercise plus relaxation and breathing therapy	156	55.7	25.0	6

Fallavollita et al. (2016)	Non-RCT	MI	5-week comprehensive cardiac rehabilitation program	37	66.0	16.2	5
Giallauria et al. (2006)	RCT	AMI	home-based CR or hospital-based CR	30	54.0		8
Korzeniowska-Kubacka (2017)	Non-RCT	MI	8-week training programme	62	58.1	48.4	8
Ku et al. (2002)	RCT	MI, CABG	Basic UC or phase I CR	60	68.5	13.3	Hospital discharge
Linden et al. (1995)	RCT	AMI	Basic UC or the Manual CR	34	61.5	32.4	1/3/6
Matsunaga et al. (2004)	Non-RCT	AMI	phase I rehabilitation program	42	62.0		Hospital discharge
Mayou et al. (2002)	RCT	AMI	Basic UC or Guideline-based early CR	114	52.9	88.0	4/12/48
Johnston et al. (1999	RCT	AMI	Basic UC or 6-week CR	100	56.1	35.0	8/24/48
Oldridge et al. (1991)	RCT	AMI	Basic UC or 8-week comprehensive CR	201	57.9	20.0	8/16/32/48
Oldridge et al. (1995)	RCT	AMI	Basic UC or 8-weeks CR	187	54.3	12.0	8/48
Pourafkari et al. 2016	Non-RCT	MI,CABG	8-week rehabilitation program	120	60.0	20.8	8
Sharif et al. (2012)	RCT	CABG	Basic UC or 4-week CR	80		32.5	8
Suzuki et al. (2005)	Non-RCT	MI, CABG	12-week CR with exercise training program	44	58.0	15.9	12
Schomer et al. (1983)	Non-RCT	MI	Basic UC or 6-week CR	16			24
Wang et al. (2012)	RCT	AMI	basic UC or home-based CR	160	57.3	14.7	6/12/24
Wang et al. (2016)	RCT	MI	Basic UC or 4-week home-based self-management CR	128	54.9	9.4	4/16
Yonezawa et al. (2009)	Non-RCT	MI, CABG,	Basic UC or 20-week phase II CR	109	56.0	17.43	24
Yoshida et al. (1999)	Non-RCT	AMI	Basic UC or 4-week hospitalized phase II CR	63	57	7	4/24
Yoshida et al. (2001)	Non-RCT	AMI	Basic UC or 2-week hospitalized phase II CR	85	52	8	2/4

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