Preventive Medicine 114 (2018) 24–38

Contents lists available at ScienceDirect

Preventive Medicine

journal homepage: www.elsevier.com/locate/ypmed

Review Article

The effect of community-based interventions for cardiovascular disease secondary prevention on behavioural risk factors

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ARTICLE INFO

Keywords:
Cardiovascular diseases
Secondary prevention
Behavioural medicine
Risk reduction behaviour
Review

ABSTRACT

Cardiovascular disease (CVD) is the leading cause of death worldwide, and its prevalence is increasing; with limited healthcare resources, secondary prevention programmes outside traditional hospital settings are needed, but their effectiveness is unclear. We aimed to assess the effectiveness of secondary prevention cardiovascular risk reduction programmes delivered in venues situated within the community on modification of behavioural risk factors. We searched five databases (MEDLINE, EMBASE, CINAHL, PsycINFO, Cochrane library) to identify trials of health behaviour interventions for adults with CVD in community-based venues. Primary outcomes were changes in physical activity, diet, smoking and/or alcohol consumption. Two reviewers independently assessed articles for eligibility and risk of bias; statistical analysis used Revman v5.3. Of 5905 articles identified, 41 articles (38 studies) (n = 7970) were included. Interventions were mainly multifactorial, educational, psychological and physical activity-based. Meta-analyses identified increased steps/week (Mean Difference (MD): 7480; 95% CI 1,940, 13,020) and minutes of physical activity/week (MD: 59.96; 95% CI 15.67, 104.25) associated with interventions. There was some evidence for beneficial effects on peak VO_2, blood pressure, total cholesterol and mental health. Variation in outcome measurements reported for other behavioural risk factors limited our ability to perform meta-analyses. Effective interventions were based in homes, general practices or outpatient settings, individually tailored and often multicomponent with a theoretical framework. Our review identified evidence that interventions for secondary CVD prevention, delivered in various community-based venues, have positive effects on physical activity; such opportunities should be promoted by health professionals.

1. Introduction

Globally, cardiovascular disease (CVD) is the leading cause of mortality (Wang et al., 2016). CVD morbidity rates are also rapidly rising, with an estimated worldwide prevalence of 200.5 million in 2015 (Vos et al., 2016). This has had large direct and indirect social and economic consequences, costing the UK economy in 2015 approximately £24.0 billion (Wilkins et al., 2017). Although secondary prevention and cardiac rehabilitation (CR) can reduce CVD morbidity and mortality, their uptake is poor; in the UK, only 47% of patients attend CR after a cardiac event (Doherty et al., 2015). Reasons for lack of participation include travel distance, belief in ability to manage their condition alone and lack of time (De Vos et al., 2013). Many individuals with CVD fail to change their behavioural risk factors and there is a need for improved methods of delivering secondary prevention services (Kotseva et al., 2016). The use of non-traditional healthcare settings (such as community centres, churches and leisure centres) and home-based programmes in helping to overcome barriers and improve uptake of secondary CVD prevention has been studied. Clark et al.'s (2010) review of 39 randomised control trials (RCTs) on home-based secondary prevention programmes for coronary heart disease (CHD) found small to moderate significant improvements for quality of life, systolic blood pressure, smoking cessation, total cholesterol and depression. (Devi et al.'s (2015) review of RCTs evaluating internet delivered secondary interventions for CHD found some evidence for beneficial effects on quality of life, dietary outcomes and PA. However, both reviews found studies were of low quality and there was much heterogeneity in outcome measures used. Furthermore, previous systematic reviews have focused on particular settings (e.g. participants' homes) (Clark et al., 2010), specific behavioural risk factors (e.g.

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https://doi.org/10.1016/j.ypmed.2018.05.019
Received 26 October 2017; Received in revised form 3 May 2018; Accepted 20 May 2018
Available online 24 May 2018

smoking) (Barth et al., 2015) or different modes of delivery (e.g. internet) (Devi et al., 2015; Neubeck et al., 2009; Widmer et al., 2015). There is a lack of evidence for the relative effectiveness of interventions which involve various modes of delivery in different venues situated within the community, on multiple behavioural risk factors. Thus, we aimed to conduct a systematic review, including meta-analysis to examine the effectiveness of interventions, delivered in community-based venues, on modification of behavioural risk factors in the secondary prevention of CVD. We also included biophysical outcomes, mental and physical health measures and total mortality in our analyses in order to gain insight into the potential wider health benefits of the included studies.

2. Methods

2.1. Protocol & registration

We designed the review protocol (www.crd.york.ac.uk/PROSPERO; registration no. CRD42015030014) based on the PRISMA statement (Moher et al., 2009).

2.2. Eligibility criteria

We considered studies to be eligible if participants were community-dwelling adults aged ≥18 years with a CVD diagnosis. Interventions needed to have a lifestyle/behaviour change focus for secondary CVD prevention and address one or more of: physical activity (PA), diet, smoking and/or alcohol. Comparisons were either no intervention or minimal intervention. Eligible studies were those that had interventions delivered within a venue situated in the community, including general practices, participants' homes and community centres, excluding hospitals. Community and population level interventions were not eligible for inclusion. Primary outcomes were the change of a behavioural risk factor for CVD: PA, diet, smoking and/or alcohol consumption. Secondary outcomes included peak VO_2, blood pressure, total cholesterol, body mass index (BMI), waist circumference, mental and physical health, and total mortality. We included studies with a minimum of three months' follow-up from baseline; study designs included randomised controlled trials (RCT), cluster RCTs, quasi-experimental designs using a control population for comparison, interrupted time-series studies, and prospective controlled cohort studies (Baker et al., 2015). Limits were set to publications in English language but no regional restrictions were applied.

2.3. Information sources

We conducted searches in MEDLINE, EMBASE, CINAHL, PsycINFO and Cochrane library from January 2005 to 8th June, 2015 related to the concepts: CVD, health-related behaviours, preventive interventions (Ebrahim et al., 2011) and study design (Baker et al., 2015) (Appendix 1). Relevant terms were searched as subject headings, and key words relating to the subject headings were entered as truncated terms (using *), and/or searched for as adjacent terms (using "adj") (title and abstract). Terms relating to the concept of setting were not included in the search to avoid potentially excluding or misclassifying settings, especially in different countries. We searched reference lists of relevant systematic reviews for other potentially eligible studies.

2.4. Study selection

We imported results from searches into Refworks (v3.1, ProQuest, U.S.A.) and removed duplicates. Study titles and abstracts were screened independently by ERL and DTB. We obtained full text papers that were deemed potentially relevant and also screened independently for eligibility. In cases of disagreement or uncertainty, we reached consensus via a third reviewer (MEC or MAT).

2.5. Data collection process

Data were extracted from our included studies independently by ERL and DTB and cross-checked for consistency. If studies provided data for multiple follow-up time points, we extracted data for the time furthest from baseline. We made attempts to contact authors to retrieve missing data.

2.6. Risk of bias

ERL and DTB assessed the studies independently, using the Cochrane Collaboration's tool for assessing risk of bias (Higgins et al., 2011), as being 'high', 'low' or 'unclear' for each criterion and overall. Due to the nature of the studies, blinding of participants was not always feasible therefore we assessed 'Blinding of participants, personnel and outcome assessors' rather than blinding of participants alone.

2.7. Synthesis of results

We analysed data using Review Manager (RevMan version 5.3; Nordic Cochrane Centre, Copenhagen, Denmark). We used the random effects model to acknowledge heterogeneity; unstandardized mean differences were used in analysis and 95% confidence intervals (CI) were reported. We tested statistical heterogeneity using the I^2 statistic and categorised heterogeneity into: low (0% to 30%), moderate (30% to 60%), substantial (60% to 90%) and considerable (90% to 100%). We categorised follow-up from baseline outcome assessment times into subgroups of: 3 to 6 months, 7 to 12 months and > 12 months.

2.8. Additional analysis

Five studies presented their outcome data as mean change from baseline; all other studies reported the follow-up measurement values. To include data from these five studies in our analyses, we added/subtracted, as appropriate, values for change to/from the baseline means and used the standard deviation (SD) for the baseline mean in initial meta-analyses. Sensitivity analyses were conducted excluding these studies. We also conducted further sensitivity analyses, in which we excluded studies deemed to be at high risk of bias overall.

3. Results

Our electronic database searching yielded 5905 papers; three were added from reference lists of systematic reviews (Fig. 1). We removed duplicates, leaving 5758 papers for title and abstract screening; full text versions of 157 papers were assessed. In total, 41 articles, reporting 38 studies, met our inclusion criteria. Six articles (Hawkes et al., 2013; Lindsay et al., 2009; Lindsay et al., 2008; Redfern et al., 2009; Redfern et al., 2010; Turkstra et al., 2013) reported the outcomes of three studies; for each study, the earlier article was used as the study reference. Common reasons for exclusion were participants' age (< 18 years), no reported control group, no outcomes relevant to this review and lack of behaviour change intervention.

3.1. Study characteristics

Studies included 7970 participants with a mean age of 62.3 years (SD 5.3) and 78% of participants were male. Participants' diagnoses were reported as coronary heart disease (CHD) (Delaney et al., 2008; Lear et al., 2006; Lian et al., 2014; Michalsen et al., 2006; Murphy et al., 2009; Pischke et al., 2008; Reid et al., 2007; Reid et al., 2012; Seki et al., 2008; Senuzun et al., 2006; Sniehotta et al., 2005), acute coronary syndrome (ACS) (Redfern et al., 2009; Munoz et al., 2007; Blasco et al., 2012; Cohen et al., 2014; Houle et al., 2011; Krebs et al., 2013; Reid et al., 2011) and myocardial infarction (MI) (Hawkes et al., 2013; Oerkild et al., 2012; Adams et al., 2007; Hanssen et al., 2007; Logan