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Systematic Review/Meta-analysis

# Sex Differences in Cardiac Rehabilitation Adherence: A Meta-analysis

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## ABSTRACT

**Background:** Cardiac rehabilitation (CR) participation is associated with significantly lower mortality, and this benefit has been established as dose-dependent. Because it has been suggested that women are adherent to CR programs less than men, the objective of this study was to review CR adherence among women and men, and to determine whether a sex difference exists.

**Methods:** MedLine, CINAHL, EMBASE, PsycINFO, and the Cochrane databases were systematically searched. Titles and abstracts were screened, and selected full-text articles were independently considered on the basis of predefined inclusion/exclusion criteria. Data from included articles were extracted by 2 authors independently and assessed for quality. The meta-analysis was undertaken with predefined subgroup analyses.

**Results:** The search identified 5148 articles, of which 149 were fully examined for inclusion consideration. Fourteen studies reporting data on 8176 participants (2234 [27.3%] women) were included. Overall,

## RÉSUMÉ

**Introduction :** On sait que la réadaptation cardiaque (RC) est associée à une réduction significative de la mortalité et que ce bienfait est proportionnel au nombre de séances de RC. Puisqu'il a été dit que le taux de participation des femmes aux programmes de RC est inférieur à celui des hommes, cette étude avait pour objectif de comparer l'observance de ces programmes chez les hommes et les femmes afin de déterminer s'il y avait un écart à ce chapitre entre les 2 sexes.

**Méthodes :** Nous avons procédé au dépouillement systématique des bases de données MEDLINE, CINAHL, EMBASE, PsycINFO et Cochrane. Les titres et les résumés ont été passés en revue et des articles de plein texte ont été passés au crible à l'aide de critères d'inclusion et d'exclusion prédéfinis. Les données tirées des articles retenus ont été revues par 2 auteurs indépendants et évalués en vue de déterminer leur qualité. Une métaanalyse a ensuite été menée par l'intermédiaire d'analyses par sous-groupes prédéfinis.

**Résultats :** La recherche a permis de sélectionner 5148 articles dont

Cardiovascular disease continues to be the leading cause of morbidity and mortality among men and women globally.[1] However, women who suffer an acute coronary event might be more likely than men to incur morbidity and mortality in the short-term.[2] In addition, they often have lower levels of physical function, are less physically active, of lower socioeconomic status, and are at greater risk in the context of smoking and diabetes than men.[3] For these reasons, secondary prevention is of paramount importance, particularly among women.

Cardiac rehabilitation (CR) programs offer structured exercise, education, counselling, and risk reduction strategies to promote secondary prevention. CR participation is associated with a reduction in recurrent cardiac events, as well as improved survival, functional status, and psychosocial well-being.[4,5] Considering the abundance of empirical evidence, class I, level A clinical practice guideline recommendations[6,7] promote CR use.

A risk-treatment paradox is observed however, such that although women might be in greater need of the secondary prevention offered through CR, they are significantly less likely than men to access it.[8,9] This sex difference has been recognized for well over a decade,[10] despite the women-specific guideline recommendations promoting their access to CR.[3]

Moreover, a dose-response association between CR adherence and mortality reductions has been established,[11] including among women.[12] It is often cited in the literature that approximately 50% of patients drop out of CR,[13-15] however, we would argue that there is no definitive empirical review to support this general claim. To our knowledge, a meta-analysis of studies reporting rates of CR adherence has

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CR adherence ranged from 36.7% to 84.6% of sessions, with a mean of 66.5 ± 18.2% (median, 72.5%). Men and women enrolled in CR adhered to 68.6% and 64.2% of prescribed sessions, respectively (mean difference = −3.6; 95% confidence interval, −6.9 to −0.3). The sex difference persisted in studies of high quality, that were undertaken in Canada, published since 2010, and where programs were longer than 12 weeks' duration and offered fewer than 3 sessions per week.

**Conclusions:** To our knowledge, this is the first meta-analysis to systematically report CR adherence rates, and results suggest that patients adhere to more than two-thirds of prescribed sessions. CR adherence is significantly lower among women than men. Identified strategies to promote adherence need to be tested among women.

149 ont fait l'objet d'une analyse détaillée en vue de leur inclusion à cette métaanalyse. Au total, 14 études cliniques portant sur 8176 participants (dont 2234 [27,3 %] étaient des femmes) ont été retenues. De manière globale, la participation aux séances de RC allait de 36,7 à 84,6 %, soit une moyenne de 66,5 ± 18,2 % (médiane de 72,5 %). Les hommes et les femmes inscrits à un programme de RC participaient à 68,6 % et 64,2 % des séances prévues, respectivement (écart moyen = -3,6; intervalle de confiance à 95 %; de -6,9 à -0,3). L'écart entre les sexes a persisté lors des études de grande qualité menées au Canada et publiées depuis 2010; les programmes en question duraient plus de 12 semaines et comportaient moins de 3 séances de RC par semaine.

**Conclusions :** Il s'agit, à notre connaissance, de la première métaanalyse ayant porté sur l'analyse systématique de l'observance des programmes de RC. Les résultats obtenus portent à croire que les patients prennent part à plus des deux tiers des séances offertes dans le cadre de ces programmes. Le taux de participation est significativement inférieur chez les femmes comparativement aux hommes. Il y a donc lieu d'évaluer auprès de la clientèle féminine les stratégies déjà établies visant à promouvoir l'observance des programmes de RC.

not been undertaken. Therefore, the objectives of this study were first to review studies that describe CR adherence among women and men, and second to quantitatively assess whether a significant sex difference exists.

## Methods

The Preferred Reporting Items for Systematic Reviews and Meta-analyses statement and recommendations were followed for this meta-analysis (http://www.prisma-statement.org).[16]

### Search strategy and data sources

Comprehensive literature searches of the Cochrane Library, CINAHL, EMBASE, PsycINFO, and MedLine/PubMed databases were conducted for peer-reviewed articles from database inception to January 2015, with support from a staff librarian (M.P.). Reference lists of key studies and reviews were also searched. Examples of subject heading search terms used were "Heart Disease," "Coronary Disease," "Rehabilitation Centre," "Cardiovascular Disease," and "Patient Participation." Some keywords used in the search included "Cardiac Rehabilitation," "Adherence," and "Compliance." The search strategy for Medline is shown in Supplemental Table S1.

### Inclusion criteria

Articles were included in the review if the following criteria were met: (1) study design consisted of a primary observational study (ie, cross-sectional, prospective, retrospective) or an interventional study (randomized controlled trials or nonrandomized studies); (2) the outcome was CR adherence, defined as ratio of completed CR sessions to those prescribed, expressed as a percentage. Numerators and denominators for the rates had to be reported in the publication, be calculable from the data presented, or provided by the corresponding author; (3) participants who were eligible for CR and had at least enrolled in a program, namely adults with acute coronary syndrome, chronic stable angina, stable heart failure, and those who underwent one of the following procedures: percutaneous coronary intervention, coronary artery bypass graft surgery, cardiac valve surgery, or cardiac transplantation; (4) The article was a full-length report, published in a peer-reviewed journal, and written in the English language; (5) rates of CR adherence were reported for men vs women; and (6) the outpatient CR program had to be comprehensive (ie, include exercise and education), supervised, and of a minimum of 8 weeks duration.

### Exclusion criteria

Meta-analyses, systematic reviews, qualitative studies, published letters, comments, editorials, case series, case reports, nonempirical, and dissertations were excluded. Additionally, published articles were excluded if they stemmed from the same cohort, in which case the publication presenting the most relevant and higher-quality evidence in relation to the objectives herein was included. Studies that focused exclusively on patients with heart failure, transplantation, or a cardiac valve disorder were also excluded, because patients might have a lower rate of adherence because of recurrent clinical events. A flow chart on the basis of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines[16] describing study selection is presented in Figure 1.

### Study selection

Citations from all databases (N = 2925) were independently evaluated by 2 authors (E.O. and J.Z.) and discrepancies were resolved by a third reviewer (T.J.F.C.). Citations were rejected if the reviewer determined that the study did not examine outpatient CR adherence according to the title or abstract.

Original articles of 149 relevant abstracts were then obtained. When adherence numerators or denominators were missing according to sex, authors were contacted to ascertain this information. Two reviewers (R.P.M. and J.Z.) then