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Exercise self-efficacy in adults with congenital heart disease☆

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ABSTRACT

Background: Physical activity improves health, exercise tolerance and quality of life in adults with congenital heart disease (CHD), and exercise training is in most patients a high-benefit low risk intervention. However, factors that influence the confidence to perform exercise training, *i.e.* exercise self-efficacy (ESE), in CHD patients are virtually unknown. We aimed to identify factors related to low ESE in adults with CHD, and potential strategies for being physically active.

Methods: Seventy-nine adults with CHD; 38 with simple lesions (16 women) and 41 with complex lesions (17 women) with mean age 36.7 ± 14.6 years and 42 matched controls were recruited. All participants completed questionnaires on ESE and quality of life, carried an activity monitor (Actiheart) during four consecutive days and performed muscle endurance tests.

Results: ESE in patients was categorised into low, based on the lowest quartile within controls, (≤29 points, n = 34) and high (>29 points, n = 45). Patients with low ESE were older (42.9 ± 15.1 *vs.* 32.0 ± 12.4 years, $p = 0.001$), had more complex lesions (65% *vs.* 42%, $p = 0.05$) more often had New York Heart Association functional class III (24% vs. 4%, p = 0.01) and performed fewer shoulder flexions (32.5 ± 15.5 *vs.* 47.7 ± 25.0, $p = 0.001$) compared with those with high ESE. In a logistic multivariate model age (OR; 1.06, 95% CI 1.02–1.10), and number of shoulder flexions (OR; 0.96, 95% CI 0.93–0.99) were associated with ESE.

Conclusion: In this study we show that many adults with CHD have low ESE. Age is an important predictor of low ESE and should, therefore, be considered in counselling patients with CHD. In addition, muscle endurance training may improve ESE, and thus enhance the potential for being physically active in this population.

1. Introduction

Due to advances in surgical and medical care, the majority of children born with congenital heart disease (CHD) reach adulthood. Therefore, this patient group is a growing and aging population [1] and with improved survival increased need for re-intervention might be expected in adults with CHD [2]. The exposure to traditional cardiovascular risk factors in addition to the potential need for re-intervention renders the prevention of acquired cardiovascular disease even more important in this group. In the prevention of acquired cardiovascular disease physical activity plays an important role [3–5].

On a group level, adults with CHD have reduced aerobic exercise capacity [6] and impaired muscle endurance [7,8]. The reasons for this are multifactorial and includes cardiac limitations, respiratory causes [9–11], inappropriate advice regarding exercise [12] and overprotection by parents and relatives [13]. Physical activity improves health, exercise tolerance as well as quality of life in adults with CHD, and exercise training is a high-benefit low risk intervention in most patients with CHD [14]. Also, we previously showed that a more physically active lifestyle is associated with better quality of life in adults with congenital aortic valve disease [15]. Thus, physical activity seems to be important for quality of life, but in adults with CHD there are several factors that may potentially limit a physically active lifestyle.

Self-efficacy refers to patient's initial decision to perform behavioural changes and their capability to successfully adhere to specific health behaviours such as compliance to exercise training regimes [16]. To measure exercise self-efficacy (*i.e.* measuring the confidence in performing physical exercise), different versions of the exercise self-efficacy scale have been used [17–21]. We have previously reported that exercise self-efficacy, using the protocol suggested by Ahlström [21], on a group level is reduced in adults with CHD [8], but variables that are related to exercise self-efficacy in this population are essentially unknown.

In the present paper we studied exercise self-efficacy in a population with mixed CHD, and compared these data with an age and sex matched

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Table 1
Distribution of heart lesions and classification into simplex *vs.* complex lesions.

Simple lesion	n = 38	Complex lesion	n = 41
CoA	9[b]	d-TGA (atrial switch)	4
AS	3	ccTGA[c]	1
AR	3[a]	ToF	9
AS/AR	4[a]	PA	3
ASD	2	DORV	2
VSD	14[a]	DILV[c]	1
PFO	1[a]	TCPC	9
PDA	1[a]	RA-PA Fontan	2
MR	1[a]	Ebstein[c]	3
		Eisenmenger[c]	6
		Miscellaneous	1

CoA, coarctation of the aorta; AS, aortic stenosis; AR, aortic regurgitation; ASD, atrial septal defect; VSD, ventricular septal defect; PFO, persistent foramen ovale; PDA, persistent ductus arteriosus; MR, mitral regurgitation; d-TGA, d-transposition of the great arteries; ccTGA, congenitally corrected transposition of the great arteries; ToF, tetralogy of Fallot; PA, pulmonary artresia; DORV, double outlet of the right ventricle; DILV, double inlet of the left ventricle; TCPC, total cavo-pulmonary connection. RA-PA, right atrium to pulmonary artery.

[a] One patient had a previous intervention.
[b] Six patients had previous interventions.
[c] No previous intervention.

population (non-CHD). The aim was to identify factors related to low exercise self-efficacy in adults with CHD, and potential strategies for being physically active.

2. Methods

2.1. Patients

Seventy-nine adult patients (≥18 years) with CHD were recruited from the University hospital centres in Umeå and Lund in Sweden. The inclusion criteria were periodic out-patient medical visits for CHD and a clinically stable condition over the past three months. The exclusion criteria were cognitive impairment, disability or mental illness affecting independent decision-making, extra-cardiac disease affecting physical activity or other circumstances making participation unsuitable. To achieve a balanced diversity of diagnoses and complexities (since the simple lesions are much more common) patients were recruited into the following four different groups based on diagnosis: (1) shunt lesions, (2) left-sided lesions, (3) repaired tetralogy of Fallot/transposition of the great arteries (TGA), and (4) Eisenmenger/Fontan/TCPC/other complex lesions. Forty-two patients had at least one previous intervention (simple lesions 32%, complex lesions 73%) (Table 1). No patients had a lesion indicating intervention, *e.g.* severe aortic diagnosis. Among the patients eighteen had beta-blockers, five had calcium channel blockers and twenty-one had angiotensin converting enzyme inhibitors/angiotensin II receptor blockers. Recruitment was continued until each group comprised at least 20 patients with complete data. Groups (1) and (2) were classed as 'simple' lesions and (3) and (4) as 'complex' lesions, see Table 1. This classification has been used by others [22] and harmonizes with the expected exercise capacity [6]. The recruitment of patients was previously described in detail [23].

Forty-two age and gender-matched controls (non CHD or any of the exclusion criteria presented above) who lived in the Umeå area were randomly recruited *via* the Swedish national population register. For each gender, the patients were ranked according to age. For every consecutive pair of patients with the same gender a control person with the mean age of this pair of patients was recruited. Among the controls, five had anti-hypertensive treatment, two had ASA, one had statins and one had all three treatments. Fig. 1 gives an overview of patient and control group recruitment. This population of patients and controls were also included in previous reports that focused other outcomes [8,23]. Prior to participation in the present study or previous studies patients and controls gave their informed consent.

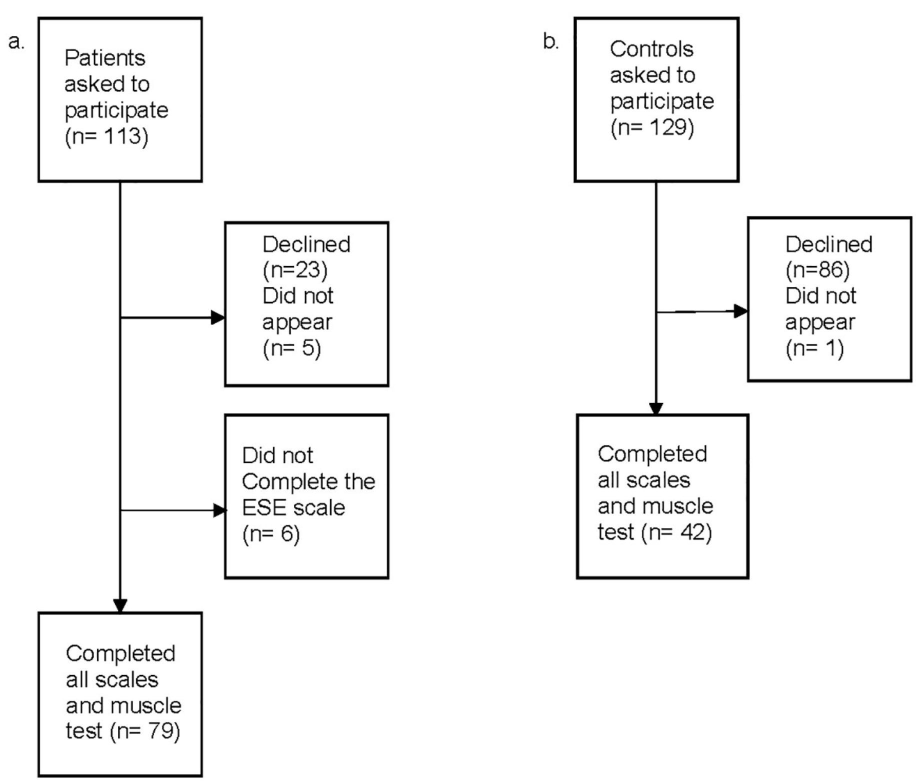

Fig. 1. Overview of recruited patients (a) and controls (b).