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A PROSPECTIVE STUDY ON EFFECTS OF HOME-BASED CARDIAC REHABILITATION IN CARDIOVASCULAR RISK FACTORS MANAGEMENT

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INTRODUCTION

Cardiac rehabilitation (CR) is an important prognosis management program for cardiovascular disease patients to recover quickly and prevent recurrence, re-admission, and early death, but actual patients' participation in CR is still very low. Home-based CR (HBCR) was introduced to expand access and participation of patients over conventional center-based CR (CBCR). However, there is a high possibility that HBCR will not be strictly enforced compared to CBCR. So, this study aimed to compare the effect of HBCR to CBCR, and we focused on cardiovascular (CV) risk factors management.

Methods

We conducted prospective study on participants who were recruited at the CR clinic from February to September 2021. The participants were stratified into CBCR and HBCR groups according to the risk of exercise-related CV event and socioeconomic factors of each patient. CBCR group participated in more than two sessions of ECG monitoring exercise training in hospital setting and HBCR group received comprehensive educational programs and did self-training. We investigated the results of 'Lifestyle Questionnaire' survey adapted from 'Health Insurance Corporation Health Checkup Questionnaire'. In addition, cardiorespiratory fitness (CRF) level and other risk factor management results were collected. We compared the mentioned parameters at baseline, 3 months, 6 months, and 12 months in the CR clinic, and the differences between two groups were examined.

Results

There were a total of 90 patients at first, but 40 patients were dropped out for various reasons, and a total of 50 patients completed one-year follow-up (Table 1). In BMI, only CBCR group at 3 months showed significant decrease compared to baseline. Whereas there was no significant change in serum HbA1c, in serum HDL, CBCR showed significant increase at 6 months and 12 months, and in serum LDL, both groups showed significant decrease at 3, 6, and 12 months. Lifestyle parameters including drinking alcohol frequency and eating habits showed statistically significant improvements, but psychological status showed no significant changes. Maximal METs also increased at 3 months in CBCR group and 6, 12 months in both groups. The duration of high-intensity exercise per week did not showed significant changes, but the duration of moderate-intensity exercise increased significantly at 3, 6, and 12 months in both groups. However, the number of current smokers did not decrease in both groups (Table 2, Figure 1).

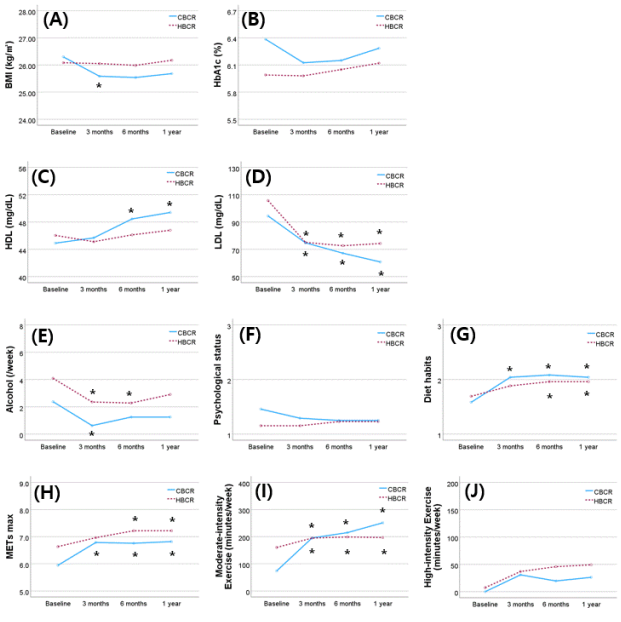

Figure 1. Six months trend of data between CBCR (solid line) and HBCR (dotted line) groups.
(A) BMI, (B) HbA1c, (C) LDL, (D) HDL, (E) Alcohol habits (day/month), (F) Psychological status (1-calm, 2-mild unstable, 3-very unstable), (G) Diet habits of eating high-cholesterol food (1-often, 2-sometimes, 3-not), (H) METs (maximum), (I) Moderate-intensity exercise habits (min/week), (J) High-intensity exercise habits (min/week). HBCR, home-based cardiac rehabilitation; CBCR, center-based cardiac rehabilitation.
No significant difference between two groups. *p-value<0.05, significantly different from the baseline value.

Table 1. Baseline characteristics of patients in CBCR and HBCR groups

Characteristic		CBCR (n = 24)	HBCR (n = 26)	P -value
Age (years)		61.2 ± 9.3	59.5 ± 7.3	0.48
Sex, male : female		17 : 7	26 : 0	0.00*
LVEF (%)		53.9 ± 9.3	55.8 ± 9.7	0.48
Smoking history	Never	7 (29.2)	3 (11.5)	0.12
	Ex-smoker	12 (50.0)	18 (69.2)	0.58
	Current	5 (20.8)	5 (19.2)	0.58
Cardiac diagnosis	Stable angina	5 (20.8)	3 (11.5)	0.85
	Unstable angina	6 (25.0)	6 (23.1)	0.88
	Non-STEMI	4 (16.7)	6 (23.1)	0.58
	STEMI	9 (37.5)	4 (15.4)	0.08
	Others	0 (0.0)	4 (15.4)	0.04*
Comorbidity	Stroke	0 (0.0)	3 (11.5)	0.09
	Hypertension	15 (62.5)	14 (53.8)	0.55
	DM	9 (37.5)	4 (15.4)	0.08
	Dyslipidemia	10 (51.7)	9 (34.6)	0.62
	CKD	1 (4.2)	1 (3.8)	0.96
	Others	4 (16.7)	1 (3.8)	0.14
	None	4 (16.7)	3 (11.5)	0.55
FHx. of CVA.	Yes	8 (33.3)	8 (30.8)	0.85
Intervention or Operation	PCI	23 (95.8)	19 (73.1)	0.03*
	CABG	1 (4.2)	2 (7.7)	0.61
	Medication	0 (0.0)	3 (11.5)	0.09
	Others	0 (0.0)	2 (7.7)	0.17

Data are expressed as mean ± SD or number (%). HBCR: home-based cardiac rehabilitation; CBCR: center-based cardiac rehabilitation; BMI: body mass index; LVEF: left ventricle ejection fraction; STEMI: ST-segment elevation myocardial infarction; DM: diabetes mellitus; PCI: percutaneous coronary intervention; CABG: coronary artery bypass graft; n.: number; FHx of Cardio: Family history of Cardiovascular events. *p<0.05, significant difference between the two groups.

Table 2. Comparison of 6-month trend data between HBCR and CBCR groups

Lifestyle & Laboratory Results	CBCR (n = 24)				HBCR (n = 26)			
	Baseline	3mo	6mo	1year	Baseline	3mo	6mo	1year
BMI	26.3±0.7	**25.6±0.6¶**	25.5±0.6	25.7±0.6	26.1±0.7	26.1±0.6	26.0±0.6	26.2±0.5
HbA1c	6.4±0.2	6.1±0.1	6.2±0.1	6.3±0.1	6.0±0.2	6.0±0.1	6.1±0.1	6.1±0.1
HDL	44.9±2.0	45.7±2.1	**48.5±2.0¶**	**49.4±2.2¶**	46.0±1.8	45.1±2.0	46.1±1.9	46.8±2.1
LDL	94.5±7.3	**74.8±4.5¶**	**67.2±3.4¶**	**60.7±4.2¶**	105.7±7.0	**75.1±4.3¶**	**72.6±3.3¶**	**74.3±4.0¶**
METsmax	5.9±0.3	**6.8±0.3¶**	**6.8±0.3¶**	**6.8±0.3¶**	6.6±0.3	7.0±0.3	**7.2±0.3¶**	**7.2±0.3¶**
Exercise habits – High	0.0±4.7	30.8±16.6	19.6±15.0	26.3±17.0	7.3±36.9	36.9±15.9	45.8±14.4	49.2±16.4
Exercise habits – Mod	73.8±40.5	**195.4±29.1¶**	**215.0±34.3¶**	**251.3±51.7¶**	160.4±38.9	**195.0±28.0¶**	**199.0±33.0¶**	**196.9±49.7¶**
Alcohol Hx.	2.4±1.1	**0.6±0.9¶**	1.3±0.9	1.3±0.9	4.1±1.1	**02.4±0.8¶**	**2.3±0.9¶**	2.9±0.9
Diet habits	1.6±0.1	**2.0±0.1¶**	**2.1±0.1¶**	**2.0±0.1¶**	1.7±0.1	1.9±0.1	**2.0±0.1¶**	**2.0±0.1¶**
Psychological status	1.5±0.1	1.3±0.1	1.3±0.1	1.3±0.1	1.2±0.1	1.2±0.1	1.2±0.1	1.2±0.1
Current smokers	5	4	5	4	5	4	5	6

¶: significant differences from baseline ; p-value<0.05. ; Data are expressed as mean ± SD (except the number of current smokers) ; HBCR: home-based cardiac rehabilitation ; CBCR: center-based cardiac rehabilitation ; BMI: body mass index (kg/m²) ; HbA1c: Hemoglobin A1c (%) ; HDL: high-density lipoprotein (mg/dL) ; LDL: low-density lipoprotein (mg/dL) ; METsmax: maximal metabolic equivalents ; Units of Exercise habits: min/week ; Units of Alcohol Hx.: day/month ; Diet habits (eating high-cholesterol food): 1–often, 2-sometimes, 3-not ; Psychological status: 1-calm, 2-mild unstable, 3-Very unstable ; Units of Current smokers: number

CONCLUSION

The results of this study showed that the effect of HBCR was not inferior to CBCR in CV risk factors management including various lifestyle modification. However, the improvement of some indicator in CBCR group was greater and this may be due to the superior effect of CBCR. Thus, to raise the degree of completion of HBCR quality, more effective strategy such as tele-rehab or smartphone-based rehabilitation is needed. Additionally more strict strategy to stop smoking should be applied in our CR program.

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