

The Effect of Cardiac Health Promotion Program Among the General Public in Hong Kong

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CHAN ET AL.: The Effect of Cardiac Health Promotion Program Among the General Public in Hong Kong. **Objectives:** To investigate the effectiveness of cardiac health promotion program in improving the cardiovascular (CVD) risk factors, self-efficacy and 10-year general cardiovascular (CVS) risk. **Design:** Quasi-experimental cohort study. **Setting:** Local community and a rehabilitation hospital in Hong Kong. **Participants:** General population without history of CVD, were recruited through convenient sampling in between April 2008 to March 2009. **Interventions:** Subjects were arranged to attend ten sessions of empowerment workshops on cardiovascular health, diet and community exercise classes. Assessment of different health domains, self-efficacy and risks were conducted. **Results:** 215 Cantonese speaking Chinese aged 51.1 ± 9.5 , were recruited. Lack of exercise (57.7%), hyperlipidaemia (55.3%) and central obesity (51.6%) were found to have the highest prevalence among all of the CVD modifiable risk factors in this subjects' cohort. 22.8% and 3.4% of the male and female subjects had high risk for CVD respectively. After the program, subjects' total volume of exercise increased from 221.33 ± 270.37 to 256.26 ± 277.72 minutes/week ($p < 0.01$) and the level of high-density lipoprotein increased from 1.36 ± 0.30 to 1.42 ± 0.31 mmol/L ($p < 0.001$). Other domains on physical fitness and self efficacy also demonstrated significant improvement. The 10-year general CVS risk for this cohort decreased from 8.66 ± 7.43 to $7.29 \pm 5.24\%$ ($p < 0.001$). **Conclusions:** Higher prevalence in CVD risk factors was noted in our subject cohort who had low risk perception. Cardiac health promotion program, could improve physical fitness, lipid profile, blood pressure, self efficacy and absolute risk for CVD. (*J HK Coll Cardiol* 2012;20:21-30)

Cardiovascular disease, Empowerment; Exercise, Health promotion, Risk

摘要

目的：研究心臟健康推廣計劃對改善香港市民的心血管疾病風險因素、管理健康的自我勝任感和十年內心血管疾病病發機會率的成效。**設計：**準實驗隊列研究。**安排：**設於香港公營醫院內的心臟復康中心和社區心臟病人自助團體。**參加者：**於2008年4月至2009年3月期間公開接受沒有心血管疾病史的香港市民報名參加。**服務計劃：**安排參加者參與十堂心血管健康和護心飲食工作坊，並到社區設施進行運動練習。參加者在計劃進行前和完成後接受有關健康範疇、管理健康的自我勝任感和心血管疾病風險因素評估。**結果：**共215名平均年齡為 51.1 ± 9.5 的香港市民參與本計劃。在多個心血管疾病風險因素中，缺乏運動（57.7%）、高血脂（55.3%）和中央肥胖（51.6%）比例最高。22.8%男性和3.4%女性的十年內心血管疾病病發風險程度屬於高。參加者完成計劃後運動量由每星期 221.33 ± 270.37 加至 256.26 ± 277.72 分鐘（ $p < 0.01$ ），高密度膽固醇水平由 1.36 ± 0.30 加至 1.42 ± 0.31 mmol/L（ $p < 0.001$ ）。體能和管理健康的自我勝任感都有顯著改善。這隊列的十年內心血管疾病病發風險亦從 $8.66 \pm 7.43\%$ 降至 $7.29 \pm 5.24\%$ （ $p < 0.001$ ）。**結論：**計劃參加者有較高的心血管疾病風險因素，但對風險的認知程度卻低。心臟健康推廣計劃能改善參加人士的體能、血脂、管理健康的自我勝任感，並減低心血管疾病的絕對風險。

關鍵詞：心血管疾病，充權，運動，健康推廣，心血管風險

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Introduction

Cardiovascular disease (CVD) is the number one cause of death worldwide, with coronary heart disease (CHD) being the major component.¹ In Hong Kong (HK), CVD was the second leading cause of death in 2008 and CHD was the dominant component, making up 67.5% of all CVD deaths.² However, deaths caused by CHD are often preventable.

In HK, sedentary lifestyles and unhealthy eating habits predispose HK people to the development of CHD. According to the Behavioral Risk Factor Survey conducted by Department of Health,³ around 76% of people did not have moderate physical activity for three days or more per week and 29% did not walk for 10 minutes daily. In terms of dietary habits, average salt intake of HK people had increased from 8.0 g/day during 1989-1991 to 9.9 g/day during 2000-2002; the increased salt intake may associate with an age-related rise in blood pressure.⁴ On the other hand, according to the Heart Health Survey 2004/2005,⁵ 22.9% and 47.7% of the population had hyperlipidaemia and obesity respectively. The increasing popularity of Western diet and eating out habit among HK Chinese may result in changing dietary patterns which may further undermining individual health.⁶ Obviously, there is a need to help HK people to adopt a healthier lifestyle by modifying behavioral risk factors to prevent CHD.

In HK, numerous health campaigns⁷⁻¹⁰ had been launched in the community to increase public awareness about the benefits of physical exercise and to encourage the public to exercise regularly. These programs were implemented mainly by posters display, distribution of health education materials and organization of day campaign.¹¹ Although previous literatures^{12,13} had suggested that health promotion activities and educational efforts could result in behavioral changes and CVD risk reduction, when such activities and efforts were delivered by solely distribution of information to receptive public, such approach might not be effective in promoting behavioral changes¹⁴ and might have little impact on public health.¹⁵

Exercising regularly and maintaining a healthy diet are the two main effective strategies in lowering cardiovascular risk factors.¹⁶ Empowerment, key

element of health promotion and disease prevention, should be incorporated when putting these strategies into action; it is a process through which people gain control over decisions and actions that influence health.¹⁷ Health promotion program with components of behavior change and empowerment could also enhance and sustain the effectiveness of the program.¹⁸ Literature indicated that when individuals get empowered, a greater sense of self-efficacy can be developed.¹⁹ Self-efficacy influences one's level of perseverance; commitment and effort exerted to goal achievement²⁰ and have been found to be an important determinant of adherence to health behavior, lifestyle and risk factors changes that favor the clinical course of CVD.²¹

The purpose of this study was to evaluate the effectiveness of our health promotion program titled "Eat Healthy and Get Active: A lifestyle to Start and Keep" in improving CVD risk factors, exercise habit profile, physical fitness, lipid profile, self efficacy and 10-year general cardiovascular (CVS) risk.

Methods

Sample

Cantonese speaking Chinese adults aged between 18 and 80 years old were recruited through convenient sampling on the voluntary basis from the community health promotion road-shows and newspaper advertisement from April 2008 to March 2009. Subjects who were diagnosed with CVD, had uncontrolled CVD risk factors, suffered from either physical or cognitive impairment that prohibited physical activities were excluded. The power calculation was aimed to detect a small effect size of 0.2²² on any outcome variables between pre and post intervention. It was estimated that a sample size of 215 would give the study 90% power to detect an effect size of 0.2 at 5% level of significance based on paired t-test.

Intervention

This is a single group pre and post intervention study with 14 sessions of training (Figure 1). The first session of the program aimed at early identification of CVD risk factors and other health problems. Subjects

identified to have high risk for CVD or positive exercise stress test result were referred for physician consultation with early intervention of health problems. Modifiable CVD risk factors include hypertension (SBP >140 mmHg or DBP >90 mmHg), diabetes mellitus (FBS >7 mmol/L), hyperlipidaemia (LDL >3.4 mmol/L or TG >1.7 mmol/L), obesity (BMI >25)/central obesity (waist circumference >90 cm in male or >80 cm in female), lack of exercise (less than 5 days of 30 minutes

moderate intensity exercise or less than 3 days of 20 minutes vigorous intensity exercise or less than the required moderate and vigorous exercise at combination) and cigarette smoking (history of daily and non-daily or occasional smoking).

Subjects who were eligible to continue the health promotion program attended three sessions (10 hours) of the empowerment workshops (Table 1). During the empowerment process, a physiotherapist and a nurse

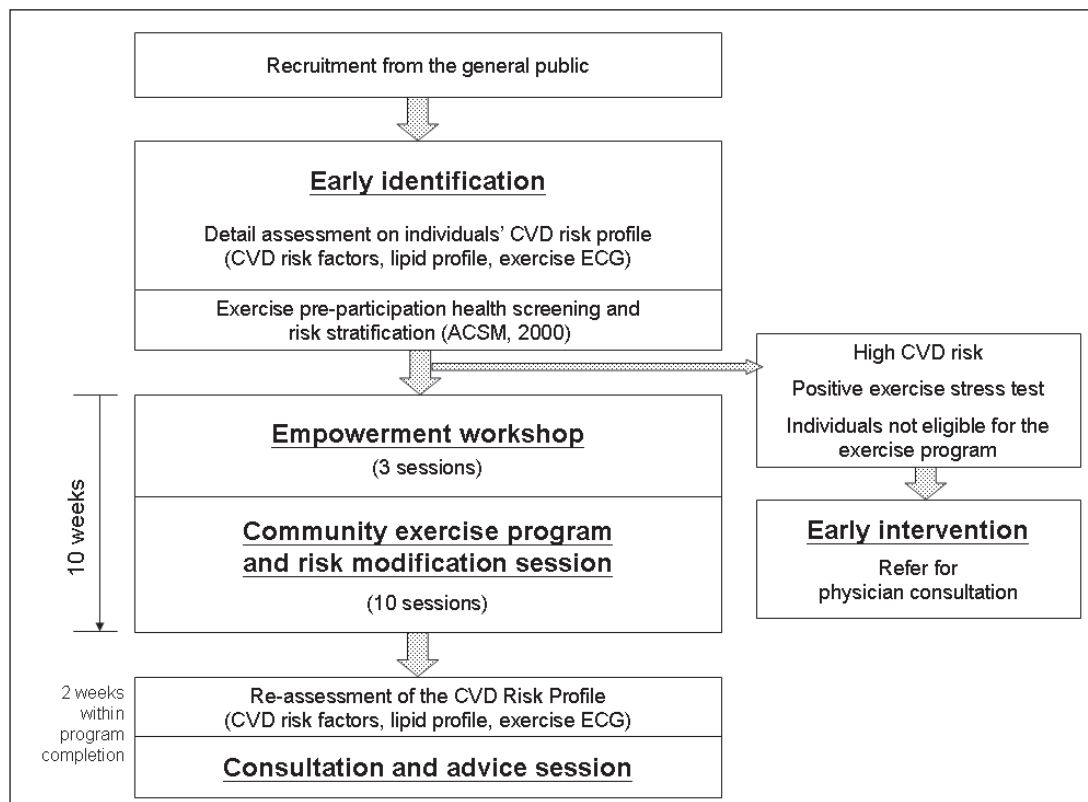


Figure 1. Workflow of the health promotion program.

Table 1. Program content

Class	Content
Empowerment workshop and risk modification session (hospital / community centre)	<ul style="list-style-type: none"> • Understanding cardiovascular disease (1 hour) • Exercise principles and practice (1 hour) • Dietary workshop (4 hours) • Supervised exercise workshop (4 hours) (Callisthenic, aerobic, resistance and group exercise)
Community exercise program (peer-support training in the community) (Ten 90-min sessions)	<ul style="list-style-type: none"> • Callisthenic exercise • Brisk walking aerobic exercise • Tai-Chi practice (Yeung's 24-style)

facilitated subjects to adopt healthy behaviors and lifestyle for CVS health through active and mutual participation, goals setting, action planning, self-reflection and peer-support.

Subjects continued to exercise and modify their risk factors with 10 more sessions of training in the community. The exercise prescription for each subject was set individually, which included callisthenic exercise, brisk walking aerobic exercise and Tai-Chi Chun practice. The exercise prescription for each subject was set individually by physiotherapist based on the result of exercise stress test.²³ The target exercise intensity was set at 50 to 80% of the heart rate (HR) reserve or at 11 to 13 of the rate of perceived exertion (RPE) (Borg's scale)²⁴ depending on the clinical status and health condition of the subjects. Subjects were also educated to titrate the exercise intensity in every exercise session according to their heart rate response and the RPE.

Outcome Measurements

Cardiac health assessments were conducted in the first session of the program and repeated after the exercise program to detect CVD risk factors and to determine the effectiveness of the program. These included exercise habit profile; anthropometric measurements (waist circumference and body weight); examination of physical fitness which included electrocardiogram (ECG), blood pressure (BP), maximal aerobic capacity, muscle strength and flexibility, fasting blood sugar (FBS) profile and lipid profile which included total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL) and triglycerides (TG). Besides, self efficacy on exercise and dietary control and 10-year general CVS risk were also assessed before and after the program.

The baseline and the post-program HR and BP measurements were the mean of the resting HR and BP measurements of each subject in the first and last three sessions of the workshop respectively to ensure accuracy. The HR and BP measurements were taken according to the recommendation of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC7).²⁵

Maximal aerobic capacity of the subject was measured by the maximal exercise stress test, which was conducted through the Exercise Testing System with 12-lead ECG monitoring. Treadmill was used as the modality for the test; the testing protocol was chosen individually based on the clinical assessment and guideline.²³

Subjects' exercise habit profiles were assessed by the Physical Activity Assessment Tool (PAAT).²⁶ Volume of exercise was measured in minutes per week. Volume of vigorous intensity activity or combinations of moderate- and vigorous- intensity activity were converted to moderate-intensity-equivalent exercise volume, for benchmarking with the recommendation.²⁷

Self-efficacy on exercise and dietary control were assessed by Cardiac Exercise Self-Efficacy Instrument – Chinese version (CESEI-C) and Cardiac Diet Self-Efficacy Instrument – Chinese version (CDSEI-C).²⁸ Subjects' 10-year general CVS risk was assessed using the sex-specific multivariable risk factor algorithm of the Framingham Heart Study.²⁹

Statistical Analysis

Data were presented using appropriate descriptive statistics. Paired t-test was used to compare data collected at baseline and two weeks after the completion of the program. Missing data were excluded. All analyses were performed with SPSS v16.0 (SPSS Inc., Chicago, IL, USA). All statistical tests involved were two-sided and p-value <0.05 was considered statistically significant.

Results

Demographic Characteristics

250 subjects were approached and only 215 subjects were included in this study. Thirty-five subjects who had positive exercise stress test result were excluded from this study and were referred for medical consultation. Among the 151 subjects (70%) who had completed the program, 62 (41%) of them were male, and the mean age was 51.1 ± 9.5 years old.

CVD Risk Factors, Exercise Habit Profile and 10-year General CVS Risk

Lack of exercise (57.7%, n=124), hyperlipidaemia (55.3%, n=119) and central obesity (51.6%, n=111) were found to have the highest prevalence among all the CHD modifiable risk factors in this subject cohort (Table 2).

Among the 215 subjects entering the exercise program, 164 (82.4%) and 76 (39.4%) subjects participated in moderate and vigorous physical activities respectively. Mean volume of moderate and vigorous exercise was 107.67 ± 131.45 and 35.15 ± 71.40 minutes/week respectively, which were equivalent to a total of 198.14 ± 253.00 minutes of moderate-intensity exercise per week. The percentage of subjects that have physical activities reached the recommendation on physical activity for health improvement²⁹ (i.e. moderate-intensity aerobic physical activity for a minimum of 30 minutes on five days each week or vigorous-intensity aerobic activity for a minimum of 20 minutes on three days each week or combinations of moderate-and vigorous-intensity activity can be performed to meet the recommendation), was 40.9% (n=88).

In terms of 10-year general CVS risk, 42.1% (n=24) and 22.8% (n=13) of the male subjects have moderate (10-20%) and high risk (>20%) for CVD respectively. While 11.6% (n=17) and 3.4% (n=5) of the female subjects have moderate and high risk for CVD respectively. In this subject cohort, 10-year general CVS risk for the male and female subjects were $15.39 \pm 11.06\%$ and $6.12 \pm 4.92\%$ respectively (Table 3), with significant difference of 9.3% ($p < 0.001$) between the two genders. Moderate and significant correlation was found between age and the 10-year general CVS risk ($r = 0.487$, $p < 0.001$); people of advancing age demonstrated higher risk for CVD.

Outcome of the Health Promotion Program Exercise Habit Profile

The total volume of exercise (moderate-intensity equivalent) increased significantly by 15.8%, from 221.33 ± 270.37 minutes/week to 256.26 ± 277.72 minutes/week ($p < 0.01$). Before the cardiac health promotion program, only 45.0% (n=68) of subjects carried out physical activities that reached the recommendation on physical activity for health

Table 2. Proportion of the modifiable CVD risk factors

Modifiable CVS risk factor	Prevalence – number (%)		Overall (n=215)	Mean±SD
	Male (n=62)	Female (n=153)		
Hypertension	21 (33.9%)	50 (32.7%)	71 (33.0%)	127.58 ± 14.39 76.47 ± 9.28
Diabetes mellitus	6 (9.7%)	6 (3.9%)	12 (5.6%)	5.17 ± 0.81
Hyperlipidaemia	43 (69.4%)	76 (49.7%)	119 (55.3%)	3.31 ± 0.87 1.33 ± 0.77
Obesity	33 (53.2%)	53 (34.6%)	86 (40.0%)	24.40 ± 3.38
Central obesity	31 (50.0%)	80 (52.3%)	111 (51.6%)	83.14 ± 9.57
Lack of exercise	39 (62.9%)	85 (55.6%)	124 (57.7%)	N/A
Smoker	10 (16.1%)	5 (3.3%)	15 (7.0%)	N/A

Hypertension=systolic blood pressure (SBP) >140 mmHg or diastolic blood pressure (DBP) >90 mmHg; Diabetes mellitus=fasting blood sugar (FBS) >7 mmol/L; Hyperlipidaemia=low-density lipoprotein (LDL) >3.4 mmol/L or Triglycerides (TG) >1.7 mmol/L; Obesity (WHO, Asian Standard)=Body Mass Index (BMI) >25; Central obesity=waist circumference >90 cm in Male or >80 cm in Female; Lack of exercise=less than 5 days of 30 minutes moderate intensity exercise or less than 3 days of 20 minutes vigorous intensity exercise or less than the required moderate and vigorous exercise at combination; Smoker=history of daily and non-daily or occasional smoking; N/A=not applicable.

improvement;²⁷ this was increased to 47.0% (n=71) after subjects had attended the program.

Physical Fitness and Anthropometric Measurements

Subjects' physical fitness were significantly improved in different aspects; aerobic capacity increased significantly by 10.1% from 10.66±1.99 METs to 11.74±2.03 METs (p<0.001). Upper limbs muscle power (chest press) increased significantly by 3.8% from 56.32±21.74 kg to 58.45±21.36 kg (p<0.001), lower limbs muscle power (leg press) increased significantly by 5.8% from 71.42±21.02kg to 75.58±20.70 kg

(p<0.001) and flexibility (sit and reach) increased significantly by 6.8% from 25.14±9.03 to 26.84±9.15 cm (p<0.001). While the reduction in waist circumference, body weight and BMI were minimal, at around 1%.

Lipid and Fasting Blood Sugar Level and the Hemodynamic Parameters

Significant improvement (3.9%) in level of HDL was found (Table 4) as it increased from 1.36±0.30 mmol/L to 1.42±0.31 mmol/L (p<0.001). Improving trends on the level of TC, TG, LDL and FBS

Table 3. 10-year general CVS risk (Age vs Gender)

Age	10-year general CVS risk (%)			Between group (Gender) p-value [‡]
	Male (n=57)	Female (n=146)	Overall (n=203)	
≤44	6.42±5.47 (n=10)	1.73±1.45 (n=27)	2.99±3.67 (n=37)	<0.001*
45-54	14.10±7.44 (n=23)	5.60±2.80 (n=74)	7.62±5.64 (n=97)	<0.001*
>55	20.37±13.07 (n=24)	9.62±6.38 (n=45)	13.36±10.52 (n=69)	<0.001*
Overall	15.39±11.06 (n=57)	6.12±4.92 (n=146)	8.73±8.29 (n=203)	<0.001*
Between group (Age) difference [§]	F=7.17 p=0.002*	F=32.24 p<0.001*	F=25.42 p<0.001*	

*Statistical significance (p<0.05); [‡]Independent sample t-test; [§]Analysis of variance (ANOVA)

Table 4. Improvement in the FBS, lipid profile and the hemodynamic parameters

			Before (n=151)	After (n=151)	% change	p-value [‡]
Lipid and FBS profile	TC	mmol/L	5.30±0.87	5.26±0.98	-0.7	0.52
	HDL	mmol/L	1.36±0.30	1.42±0.31	3.9	<0.001*
	LDL	mmol/L	3.34±0.79	3.31±0.81	-1.0	0.45
	TG	mmol/L	1.32±0.76	1.25±0.57	-5.4	0.16
	FBS	mmol/L	5.18±0.82	5.16±1.08	-0.3	0.70
Heart rate/blood pressure	Resting HR	bpm	75.02±10.30	79.52±27.04	3.2	<0.001*
	SBP	mmHg	127.80±13.93	126.53±15.31	-1.0	0.18
	DBP	mmHg	76.25±9.52	74.63±10.19	-2.1	0.01*

*Statistical significance (p<0.05); [‡]Paired sample t-test

TC=total cholesterol, HDL=high density lipoprotein, LDL=low-density lipoprotein, TG=triglycerides, FBS=fasting blood sugar, HR=heart rate, SBP=systolic blood pressure, DBP=diastolic blood pressure

were also observed, however they did not reach statistical significance. The systolic blood pressure (SBP) was reduced by 1% from 127.80 ± 13.93 to 126.53 ± 15.31 mmHg ($p=0.18$) while the diastolic blood pressure (DBP) was significantly reduced by 2.1% from 76.25 ± 9.52 to 74.63 ± 10.19 mmHg ($p=0.01$).

Self-efficacy

Mean score of subjects' self-efficacy on exercise habit (CESEI-C) increased significantly by 12.2% from 3.32 ± 0.72 to 3.72 ± 0.60 ($p<0.001$). The mean score of subjects' self-efficacy on dietary control (CDSEI-C) also significantly increased by 8.6% from 3.34 ± 0.68 to 3.62 ± 0.56 ($p<0.001$).

10-year General CVS Risk

After the program, the 10-year general CVS risk of male and female subjects had significantly reduced by 3.4% ($15.30 \pm 9.24\%$ to $11.93 \pm 6.03\%$) ($p<0.001$) and 0.6% ($6.18 \pm 4.67\%$ to $5.56 \pm 3.66\%$) ($p=0.01$) respectively (Table 5).

Age difference was also found in the improvement of the 10-year general CVS risk among different age categories (Table 5), subjects of higher age

groups were found to have a more significant reduction in the risk.

Discussion

CVD Risk Factors Profile

In 2004, a CVD risk factor prevalence survey was conducted,³⁰ the prevalence of hypertension was 23.2% in men and 17.2% in women. Comparing with the results of our study, this cohort has an increased prevalence. Our subject has low risk perception and lack of awareness of the importance of CVD prevention; up to 45% of our subjects have their CVD risk factors being identified for the first time through this health promotion program. Such lack of risk perception plays a significant role in the high prevalence of CVD in the population, as they were less apt to seek preventive treatment in the primary care, curative health care service were tend to be relied on.

Exercise Habit Profile

In regards to the exercise habit profile, this subject cohort demonstrated a higher participation rate in both

Table 5. Improvement in 10-year general CVS risk

Age	Male				Female				Overall			
	Before	After	Difference	p-value [‡]	Before	After	Difference	p-value [‡]	Before	After	Difference	p-value [‡]
≤44	8.93 ± 5.76 (n=6)	6.18 ± 2.80 (n=6)	-2.8	0.13	2.04 ± 1.73 (n=16)	2.08 ± 1.80 (n=16)	0.04	0.86	3.92 ± 4.46 (n=22)	3.20 ± 2.77 (n=22)	-0.7	0.16
45-54	14.07 ± 7.06 (n=18)	10.54 ± 4.26 (n=18)	-3.5	0.04*	5.70 ± 2.85 (n=63)	5.32 ± 3.07 (n=63)	-0.4	0.10	7.56 ± 5.40 (n=81)	6.48 ± 3.99 (n=81)	-1.1	0.01*
≥55	18.86 ± 10.94 (n=17)	15.44 ± 6.45 (n=17)	-3.4	0.05*	9.27 ± 6.45 (n=31)	7.86 ± 3.92 (n=31)	-1.4	0.03*	12.69 ± 9.42 (n=48)	10.54 ± 6.11 (n=48)	-2.2	0.005*
Overall	15.30 ± 9.24 (n=41)	11.93 ± 6.03 (n=41)	-3.4	<0.001*	6.18 ± 4.67 (n=110)	5.56 ± 3.66 (n=110)	-0.6	0.01*	8.66 ± 7.43 (n=151)	7.29 ± 5.24 (n=151)	-1.4	<0.001*
Inter-group ANOVA	F=3.16 P=0.05*	F=8.29 P=0.001*	—	—	F=17.41 P=0.001*	F=17.60 P<0.001*	—	—	F=14.57 p<0.001*	F=21.51 p<0.001*	—	—

*Statistical significance ($p<0.05$); [‡]Paired sample t-test

ANOVA=analysis of variance

moderate-level and vigorous-level physical activities after the program at 82% and 34% respectively. As compared to the findings of a similar study, which showed that the participation rate for moderate-level and vigorous-level of physical activities were only at 56% and 21% respectively.³¹ The higher participation rate may be explained by the better understanding in CVS health and benefits of exercise through the empowerment workshops, as reflected from the significant improvement in self-efficacy. Regarding the change in volume of vigorous intensity exercise, significant improvement was also observed after the program. However, achieving a regular physical activity at the recommended levels still remains a challenge.³² In this study, even after the subjects had gone through the program, less than half (47.0%) of the subjects were able to reach the latest recommendation for physical activities to improve health.²⁷ In order to achieve the recommendation, subjects need not to rely on structured exercise training alone, but to increase lifestyle physical activities to a volume of 150 minutes/week.^{23,27}

Despite the minimal contact hour for subjects at this study, physical fitness had shown a significant improvement after the program. Since physical fitness has to be gained through regular exercise practice, such improvement could possibly be resulted from the adoption of new behaviours and lifestyle as facilitated by empowerment program. However, only minimal improvement was observed in the change of anthropometric measurements, as exercise could increase lean body mass and on the other hand reduce body fat; such changes may not be reflected from the net body weight or body mass index. Also, significant changes in body weight may require a longer period and fat reduction is a result of multiple factors, including exercise training and dietary control. Although exercise habit profile had shown a significant improvement, dietary change as reflected from the CDSEI-C was less significant.

Lipid, HR and BP Profiles

Significant improvement was found in subjects' lipid profile through this health promotion program, particularly in HDL level. This echoed what literature^{23,33} suggested that regular physical activity could increase

HDL level and decrease TG level. Improving trends on the level of TC, TG, LDL and FBS was also observed in our cohort, however they did not reach statistical significance, as subjects' baseline readings were near the normal range and significant improvements may need a longer time. Clinical studies³⁴ also suggested that regular exercise could lead to reduction of SBP and such benefit was also observed in this study, with a reduction in both the SBP and DBP of around 2%. However, the increased resting HR after the exercise program was also observed in this study. This contradicting result should further be explored in future studies to ensure it is a correct phenomenon among Chinese.

10-year General CVS Risk

Subjects demonstrated an escalating 10-year general CVS risk with advancing age because age is a major risk factor for CVD. Study have shown that prevalence of the CVD risk factors increases with age and associated with an increase in predisposition to CVD.³⁵ Aging is believed to be important contributors to atherosclerosis, through mechanisms that remain largely obscure.³⁶

Gender difference was demonstrated in the 10-year general CVS risk profile with male subjects have higher risk than the female counterpart. This may be related to male gender being an independent non-modifiable risk factor for CVD,^{23,29} and male subjects exhibiting a higher prevalence in all the behavioural risk factors which result in a higher absolute risk for CVD. In addition, male subjects have a lower risk perception for their CVD risk factors, as reflected from the higher rate of the newly-identified CVD risk factors among them.

After the subjects had gone through this health promotion program, their 10-year general CVS risk reduced significantly. Subjects at moderate to high risk for CVD with advancing age achieved statistically significant reduction of risk up to 3.4%, whereas subjects with a lower initial risk had non-significant improvement.

However, it has been reported that tools for absolute CVD risk calculation may not truly reflect the genuine situation of an individual, especially for the Chinese cohorts,³⁷ as there were very few cardiovascular

risk assessment tools developed in Asian populations.³⁸ Additionally, it has been emphasized that risk scores per se do not translate to better patient outcomes unless they are used appropriately by physicians using risk communication tools and the communicated risks are well understood by the patients.²⁹ Strategic intervention to manage the CVD risk should be individualized considering the trends and progress of the CVD risk as well as additional factors such as family history, etc, which have not been incorporated in the risk estimation equations, or perhaps to perform further investigation and assist in discerning whether the individual is likely to be among the disease group.³⁹

Improvement in the Self-efficacy (Exercise and Diet)

The subjects of this study also exhibited a significant improvement in self-efficacy, meaning subjects have better understanding of the CVS health and they have become more confident in managing their own health and in establishing exercise habit. These improvements may be the results of the empowerment program. It has been suggested that improvement in self-efficacy is associated with participants' subsequent diet and exercise goal attainment.⁴⁰ Individuals who felt they were highly confident in their abilities in diet control and exercise behaviours attained more of their diet and exercise goals.⁴⁰

Study Limitation

Firstly, convenience sampling was used; therefore the findings of this study would be difficult to generalize to HK population in general. Besides, subjects were voluntarily enrolled in the program; subjects may have a higher awareness on their health with less behavioural risk factors.

Conclusion

Higher prevalence in CVD risk factors was noted in our subject cohort who had low risk perception. Cardiac health promotion program, with empowerment and exercise workshop, could improve physical fitness, lipid profile, blood pressure, self efficacy. Health

promotion policies, strategies and cross-sector collaboration are essential for the success in health promotion.

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