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**Abstract**

**Effectiveness of Tailored Health Promotion Program for Reducing Cardiovascular Risk Factors in Subway Workers**

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**Objectives:** This study explores the effects of a tailored health promotion program, in order to reduce cardiovascular risk, in areas which include hypertension, dyslipidemia, abnormal blood glucose and body mass index.

**Methods:** In this paper, health risk appraisal relating to lifestyle was surveyed and physical fitness, blood pressure and blood lipid profile and glucose were checked. Then, a 12 week tailored health promotion program with 40 subway workers of Seoul was conducted. The Tailored health promotion program included a smoking cessation program, drinking restriction, diet, exercise prescription and a stress management program.

**Results:** The number of subjects engaging in regular exercise increased from 42.5% to 100%, and the number of smokers reduced from 72.5% to 60%, and 12.5% of contemplate stage was shift to action stage. The mean level of drinking per day, significantly decreased from 34.9 g to 24.2. The body mass index, systolic blood pressure, total cholesterol, triglyceride, and Fasting blood glucose significantly decreased after the intervention program. In addition the tailored health promotion program resulted in a significant reduction in two factors for the cardiovascular high risk group, hypertension above 140 mmHg in systolic blood pressure and dyslipidemia above 200 mg/dl in triglyceride.

**Conclusion:** In this paper, it is demonstrated that the tailored health promotion program,, including the smoking cessation program, drinking restriction, diet, exercise prescription and stress management program, resulted in effective reduction in cardiovascular risk factor. Therefore associated workplace tailored health promotion programs relating to specific individual risk factor, should be developed and implemented.

**Key Words:** Cardiovascular, Risk factor, Tailored, Health promotion

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 (Goldbourt, 가  
 1986). 가 (Christenson, 1988;  
 가 Fielding & Piserchia, 1989).  
 (Nisbeth, 2000).

가 (Kannel, 1983;  
 Castelli et al, 1984; Gordon et al, 1997).

1.  
 (Woollard et al, 1995), 2004 12 2005 5  
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(Golaszewski et al, 1992).  
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 가 1)  
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가 (Jacobson et al, 1990). (Total cho-  
 lesterol, TC), (Triglyceride, TG),  
 (High density lipoprotein choles-  
 terol, HDL-C), (Low den-  
 sity lipoprotein cholesterol, LDL-C), (Blood  
 pressure, BP), (Body mass index, BMI),  
 (Ferrara et al, 1997). (Fasting blood glucose, FBG) ,  
 가 가  
 가 ( )가  
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 (Linder et al, 1983). 가 .

(Tran, 1983), 가 가 2)  
 (1)  
 (McGill, 1990).

SBP 140 mmHg , DBP 90 mmHg , FBG 110 mg/dl

(Fagerstrom, 1978)

(Dawson et al, 1995)

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3)

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(2)

2

( 가 )

가,

2

(VO2max) 가

85% (

( - )\*(0.85)+ )

. Bruce protocol

, Bruce protocol(Bruce, 1973)

(1)

:

VO2max

65 ~ 80%

$$\cdot VO_2max(mL \cdot Kg^{-1} \cdot min^{-1})=14.8-1.379(min)+0.451(mi\ddot{h})-0.012(mi\ddot{h}^2)$$

(brisk walking)

3 ~ 5

35 ~ 60

10 ~ 15

(Newton or kg)

2

(ACSM,1978).

가

60

가 (ACSM,1978).

(2)

:

가

가

(3)

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(ACSM,1978).

$$(BMI)=Kg/(m^2)$$

(4)

:

(3)

12

15 ml

TC,

TG, HDL-C, FBG

, LDL-C (

+ /5)

(Friedewald et al, 1972).

(5)

:

TC 240 mg/dl , HDL-C 35 mg/dl

가

, TG 200 mg/dl , LDL-C 160 mg/dl ,

Mc Nemar

3.

SAS 8.01

1.

12

paired t-test

38.6

68.6

kg

168.4 cm

80.2

15.2 Kg,

39.3 ml · Kg · min<sup>-1</sup>

47.4 kg

16.7 cm,

28.1

(Table 1).

2.

Table 2,

Table 3

42.5%

100%

55%가 2-3

**Table 1.** General characteristics of body composition and fitness of study subjects

Variable	Mean ± SD (n=40)
Age	38.6 ± 7.2
Weight (Kg)	68.6 ± 9.0
Height (cm)	168.4 ± 6.5
Heart Rate (BPM)	80.2 ± 3.5
Body fat (%)	15.2 ± 4.0
VO <sub>2</sub> max(mL · Kg <sup>-1</sup> · min <sup>-1</sup> )	39.3 ± 9.0
Muscle strength (kg)	47.4 ± 11.0
Flexibility (cm)	16.7 ± 6.8
Muscle endurance (frequency)	28.1 ± 9.9

**Table 2.** The change of exercise pattern for intervention of tailored health promotion program

Variable		Pre-intervention		Post-intervention	
		N=40	%	N=40	%
Exercise	Yes	17	42.5	40	100
	No	23	57.5	0	0
Frequency of exercise	2-3/month	23	55.0	0	0
	1-2/week	10	30.0	15	37.5
	3-4/week	7	15.0	23	57.5
	5-6/week	0	0.0	2	5.0
Intensity of exercise	Very low intensity	23	57.5	3	7.5
	Low intensity	3	7.5	11	27.5
	Mild	9	22.5	21	52.5
	Strong	4	10.5	4	10.0
	Very strong	1	2.6	1	2.5
Duration of exercise	<30min	12	30.0	10	20.0
	30min-1hour	18	50.0	18	50.0
	1-2hour	10	20.0	12	30.0
	>2hour	0	0.0	0	0.0
Physical Activity	Light activiry	40	100	40	100
	Moderate	0	0	0	0
	Severe	0	0	0	0
	Highly Severe	0	0	0	0
Stage of exercise	Precontemplation	12	37.5	0	0.0
	Contemplation	8	20.0	0	0.0
	Action	17	32.5	40	100

**Table 3.** The change of smoking states for intervention of tailored health promotion program

Variable		Pre-intervention		Post-intervention	
		N=40	%	N=40	%
Smoking	Non-smoker	7	17.5	7	17.5
	Ex-smoker	4	10.0	9	22.5
	Smoker	29	72.5	24	60.0
Stage of quitting	Precontemplation	2	5.0	2	5.0
	Contemplation	27	67.5	22	55.0
	Action	11	27.5	16	40.0
Nicotine dependency	0	12	30.0	16	40.0
	1-3	16	40.0	24	60.0
	4-6	9	22.5	0	0
	7<	3	7.5	0	0

**Table 4.** The change of cardiovascular risk factors for intervention of tailored health promotion program (N=40)

Variable	Pre-intervention	Post-intervention	P-value
	Mean $\pm$ SD	Mean $\pm$ SD	
Total cholesterol	201.0 $\pm$ 35.9	187.4 $\pm$ 34.6	0.009
HDL-cholesterol*	47.9 $\pm$ 9.8	50.8 $\pm$ 11.1	0.091
Triglyceride	163.2 $\pm$ 105.6	120.7 $\pm$ 74.5	0.001
LDL-cholesterol*	121.2 $\pm$ 31.6	112.5 $\pm$ 33.1	0.115
Fasting blood glucose	96.1 $\pm$ 1.9	90.0 $\pm$ 13.0	0.001
Systolic blood pressure	125.2 $\pm$ 15.1	117.3 $\pm$ 10.8	0.003
Diastolic blood pressure	78.7 $\pm$ 8.9	76.4 $\pm$ 8.5	0.229
Body mass index	24.2 $\pm$ 1.9	23.8 $\pm$ 1.9	0.001
Drink amount (n=36)	34.9 $\pm$ 38.3	24.2 $\pm$ 17.7	0.047
Nicotine dependency(n=24)	2.7 $\pm$ 2.1	2.3 $\pm$ 2.5	0.007

\*HDL: High density lipoprotein, LDL: Low density lipoprotein.

**Table 5.** The change of distribution in cardiovascular risk factors for intervention of tailored health promotion program (N=40)

Variable		Pre- intervention			Post-intervention			P-value
		Mean $\pm$ SD	N	%	Mean $\pm$ SD	N	%	
Total Cholesterol	<240	191.3 $\pm$ 29.5	34	85.0	182.2 $\pm$ 30.1	37	92.5	0.180
	240	261.0 $\pm$ 35.9	6	15.0	251.6 $\pm$ 34.1	3	7.5	
HDL-cholesterol*	35	32.0 $\pm$ 5.5	5	12.5	33.3 $\pm$ 7.5	1	2.5	0.103
	35<	51.3 $\pm$ 5.9	35	87.5	50.0 $\pm$ 6.5	39	97.5	
Triglyceride	<200	100.0 $\pm$ 60.3	24	60.0	96.3 $\pm$ 61.7	30	75.0	0.021
	200	302.0 $\pm$ 101.1	16	40.0	259.0 $\pm$ 121.4	10	25.0	
LDL-cholesterol*	<160	111.2 $\pm$ 25.7	36	90.0	106 $\pm$ 20.6	34	85.0	0.414
	160	177.3 $\pm$ 35.4	4	10.0	170 $\pm$ 31.9	6	15.0	
Fasting Blood Glucose	<110	91.5 $\pm$ 1.5	29	72.5	90.4 $\pm$ 9.1	32	80.0	0.083
	110	130.7 $\pm$ 3.0	11	27.5	115.6 $\pm$ 12.1	8	20.0	
Systolic Blood Pressure	<140	120.3 $\pm$ 10.1	33	82.5	115.9 $\pm$ 9.8	38	95.0	0.025
	140	148.1 $\pm$ 15.5	7	17.5	143.0 $\pm$ 17.6	2	5.0	
Diastolic Blood Pressure	<90	76.4 $\pm$ 6.7	34	85.0	74.4 $\pm$ 5.6	35	87.5	0.739
	90	91.6 $\pm$ 9.5	6	15.0	90.4 $\pm$ 6.1	5	12.5	

\*HDL: High density lipoprotein, LDL: Low density lipoprotein.



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66% 1가 가 (Cushman et al, 1994).  
(Eriksen, 1988).

(Ueshima et al, 1987), 1 drink 6 drink  
8 mmHg, 6 mmHg  
7.9 mmHg, 2.3 mmHg

가 가  
Wallace(2003)  
(Christenson, 1988; Fielding & Piserchia, 1989). 11 ~ 12 5 ~ 8 mmHg

가 5 ~ 25  
mmHg, 3 ~ 25 mmHg  
(Tipton et al, 1991), 11 mmHg,  
8 mmHg가  
Prior (2005) 3.7 (Hagberg et al, 2000).

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18 가  
(Powell, 1991),  
(Campbell et al, 2002; Sorensen et al, 2003). HDL-C, TG, LDL-C, BMI  
(Lakka et al, 1992; Marrugat et al, 1996).  
TC LDL-C, HDL-C  
가 가

2, 1 가 (Schuler, 1992).  
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Dawson (1995) 가  
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(Lechner & Vries, 1995),  
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12

TC

LDL-C

(Lee, 2000),

12

TC, TG, FBG SBP, BMI,

가

TC, LDL-C, TG

( , )

LDL

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가

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가

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12

42.5% 100% 가

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가 57.5% 7.5%

가 72.5% 60%

12.5% 가

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34.9g 24.2g

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140 mmHg

al, 2002)

200 mg/dl

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TC, TG,

FBS BP, BMI

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