

The Effect of a Life Style Modification Campaign for Bangkok Provincial Electricity Officers

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ABSTRACT

Background: Office workers with sedentary life styles might be at risk to become obese and later develop cardiovascular risk factors. A life style modification campaign (LSMC) had been introduced to 4,300 provincial electricity officers (PEO) during July 2007-June 2008. The campaign was designed with the aim to encourage behavioral change within a large organization.

Objective: To evaluate the effectiveness of the LSMC on improving health status among PEOs who attended the program regularly, occasionally, and rarely.

Methods: A quasi experimental study was performed to compare pre- and post- health status records (HSR) including: body mass index (BMI), systolic blood pressure (SBP), waist-hip circumference ratio (WHC), skin fold measurement (SFM), hand grip strength (HG), body flexibility (BF) and cardio-respiratory fitness (CRF) of the PEOs who attended the LSMC.

Results: After 1 year of LSMC, there were 173 PEOs who completed the program. Within the regularly attending group, we found statistically significant improvement in BMI, SBP, WHC, SFM, and CRF with p-values of 0.02, 0.03, <0.001, <0.001 and 0.048 respectively. Meanwhile the group that occasionally and rarely attended the program did not do as well.

Conclusion: The LSMP has demonstrated its effectiveness in reducing modifiable risk factors within the well compliant group. The benefit toward work performance or the cost effectiveness of the campaign was not included in this study.

Keywords: Cardiovascular risk factor, life style modification, physical fitness

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Obesity epidemic is a growing problem in many countries as well as in Thailand. From the Thai National Health Examination Surveys in 2004, there were 22.4% and 34.3% men and women who were obese (BMI ≥ 25 kg m⁻²).¹⁻³ Office workers with sedentary life style face a high risk to become obese and later develop cardiovascular risk factors.⁴ In an attempt to reverse this trend a comprehensive program to promote behavioral change was tested for its effectiveness.

In 2007, The National Health Security Office of Thailand had provided a grant of 2.2 million Baht (\$65,000) for The Faculty of Medicine Siriraj Hospital, Mahidol University to develop a pilot life intervention campaign. The headquarters of the Provincial Electricity

Authority of Thailand, located in Bangkok with 4,300 officers, agreed to participate as a subject provider for this project. A life style modification campaign (LSMC) had been specifically designed aiming to encourage behavioral change, which is generally known to be difficult to achieve. It was a totally voluntary program comprised of 5 supportive components including:

1. Providing basic knowledge of choosing healthy meals through 6 monthly-dietary workshops.
2. Encouraging daily physical activity using an aerobic dance exercise training group.
3. Providing group support in weight reduction through 40 sessions of smoking cessation and weight reduction group support.
4. Regularly reminding about healthy life style using monthly health reminder handouts (500 / print).
5. Providing a rewarding system (individual and team weight-reduction competitions).

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The campaign started in July 2007 with multiple announcements to all provincial electrical officers (PEO), inviting them to receive a free-of-charge general health status screening exam measuring: body mass index (BMI), systolic blood pressure (SBP), waist-hip circumference ratio (WHC), skin fold measurement (SFM), hand grip strength (HG), body flexibility (BF) and cardio-respiratory fitness (CRF). At the end of the campaign in June 2008, the final health statuses of all participants were again measured.

The objective of this study was to evaluate the effectiveness of the LSMC as a behavioral changing strategy for middle-class officers of a large organization, the Provincial Electricity Authority of Thailand.

MATERIALS AND METHODS

This study was approved by the Institutional Research Board of the Faculty of Medicine Siriraj Hos-

pital (293/2551 EC3, COA 423/2008). The project was carried out during July 2007 - June 2008 as a quasi experimental study to compare pre- and post- health status records (HSR) including: BMI, SBP, WHC, SFM, HG, BF and CRF of the PEOs who attended the LSMC and had both initial & final HSR.

The measurements of all outcomes including weight, height, blood pressure, etc. were performed by a Siriraj nursing team. They were orientated to use the same standard measurement (Table 1) on both the start and the final days of the campaign. The investigators categorized each participant who had attended the program regularly, occasionally or rarely using the total LSMC score calculated from a self report questionnaire. (Table 2-4)

Statistic analysis

The data was analyzed by SPSS version 10.0. For one sample, continuous paired data, univariate

TABLE 1. Health Status Record (HSR).

Health Status Variables	Unit	Instruments: Standard measurement	Calculation method
Body mass index	Kg/m ²	<ul style="list-style-type: none"> ● Body weight scale (Kg) ● Height scale (cm) 	Body weight (kg) divided by Height (cm) ²
Systolic blood pressure	mmHg	Sphygmomanometer: Blood pressures were record in an upright position after resting for 5 minutes	Used an average value of 2 systolic blood pressures from both arms.
Waist-hip circumference ratio	-	Tape measure: Measuring <ul style="list-style-type: none"> ● Waist circumference = at the narrowest part of the trunk ● Hip circumference = at the widest part of the trunk 	Used a ratio of waist-hip circumference. ⁵
Skin fold measurement	% body fat	Lange skin fold caliper: Measuring three skin fold Sites <ul style="list-style-type: none"> ● Chest - For men, get a diagonal pinch half way between the armpit and the nipple. For women need a diagonal pinch 1/3 of the way from the arm pit to the nipple. ● Abdominal - A vertical pinch about one inch from umbilicus. ● Thigh - A vertical pinch halfway between the knee and top of the thigh. 	<p>Used the summation of three skin fold sites (SUM3) to calculate %body fat⁶</p> <ul style="list-style-type: none"> ● For men: Bone Density = 1.1093800 - (0.0008267 * SUM3) + (0.0000016 * SUM3²) - (0.0002574 * Age) Body fat percentage = [(4.95/Bone Density) - 4.5] 100 ● For women: Bone Density = 1.0994921 - (0.0009929 * SUM3) + (0.0000023 * SUM3²) - (0.0001392 * AGE)
Hand grip strength	Kg/Body weight	Hand grip dynamometer: squeezes the dynamometer with maximum isometric effort for 5 seconds with the arm at right angles and the elbow by the side of the body. ⁷	<p>Body fat percentage = [(4.95/bone density) - 4.5] 100</p> <p>Used an average value from 2 readings of the dynamometer.</p>
Body flexibility	Centimeter	Sit & reach box, ruler, and wall: slowly bend hips and reach forward as far as possible. Move fingers along ruler to reach final position. Measure the distance between starting point and reached point. ⁸	Used an average value from 2 measurements.
Cardio-respiratory fitness	Kpm/ min	Stationary cycle : aerobic power ⁹	Quantified as the maximum volume of minute oxygen uptake measured during a graded treadmill test. Power (watts)* 10.8 bodyweight (kg)+7 = estimated VO ₂ Aerobic power = force*distance/ time = Kg*6 (meters)*rpm

analyses were performed to first judge normal distribution. In this study due to the relatively large data in each category (N >30), Z-test was used to compare HSRs of pre- and post-LSMC. The mean and standard deviation are presented. All tests were 2-tailed, using an alpha of 0.05.

RESULTS

1,850 PEOs completed the initial HSR. Among these 307 persons (16.60%) were considered overweight/obese and 170 persons (9.2%) had already been diagnosed to have diabetes or hypertension. After one year of LSMC, there were 173 PEOs who completely followed the program. We categorized them based on the total LSMC score as shown in Diagram 1.

Within the regularly attending group, we found statistically significant improvement on BMI, SBP, WHC, SFM, and CRF with p-values of 0.02, 0.03, <0.001, <0.001 and 0.048 respectively. Meanwhile the group that occasionally and rarely attended the program did not do as well. (Table 5)

TABLE 2. Exercise score conversion.

Reported Exercise time (min/week)	Assigned exercise score
<60	6
60-150	8
>150	10

TABLE 3. Workshop score conversion.

Reported number of workshop attendance	Assigned workshop score
1/6	2
2/6	3
3/6	5
4/6	7
5/6	8
6/6	10

TABLE 4. Total LSMC score = Assigned exercise score + Assigned workshop score.

Total LSMC Score = 20	LSMC Attendance Category
>= 14	Regularly
8-13	Occasionally
<8	Rarely

TABLE 5. Three categories of LSMC attendance and their effect on HSRs.

		BMI		SBP		WHC		SFM		HG		BF		CRF	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Regularly attended 20.8%	Mean (SD)	25.58 (3.67)	24.02 (5.29)	135.78 (17.41)	130.92 (14.91)	88.63 (10.08)	85.85 (10.43)	33.27 (9.05)	30.62 (9.16)	4.39 (2.07)	4.94 (2.51)	8.17 (4.34)	8.33 (4.37)	29.17 (9.60)	31.75 (8.48)
	P value	0.018*		0.03*		< 0.001*		<0.001*		0.06		0.62		0.048*	
Occasionally attended 48.6%	Mean (SD)	25.03 (4.21)	24.92 (3.32)	131.18 (18.80)	127.98 (17.70)	89.69 (10.05)	86.88 (10.20)	33.06 (7.31)	31.87 (7.25)	4.59 (2.15)	4.92 (2.21)	8.12 (3.86)	7.91 (3.68)	27.06 (6.78)	27.73 (6.62)
	P value	0.70		0.059		<0.001 *		<0.001 *		0.026 *		0.37		0.18	

DISCUSSION

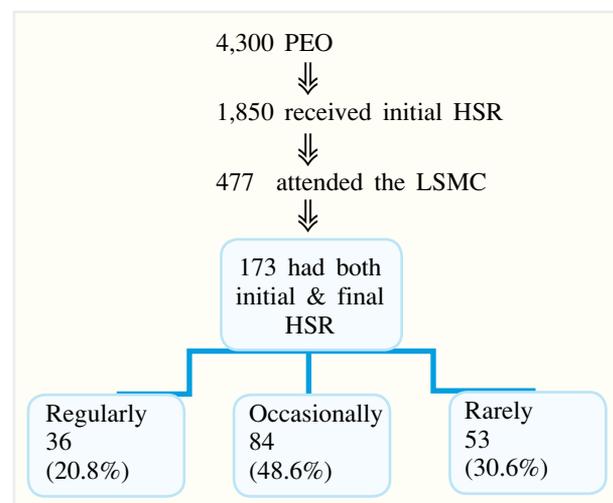
The public is now well aware that inadequate physical activity is one of the independent risk factors for development of cardiovascular disease.¹⁰ The majority of cardiovascular risk factors are modifiable through behavioral change. However, for many people especially office workers with sedentary life styles, it is difficult to engage and maintain a healthy lifestyle.

Several attempts to prove the benefit of the therapeutic life style intervention using randomized clinical trials have faced with the same major limitation- "subjects could not maintain long-term adherence to the assigned interventions". Thus, most of the evidence for the benefit of exercise comes from observational studies.

The study hypothesis was that a health promotion campaign introduced by the company together with the specially-designed five components of LSMC strategy might be able to increase staffs' adherence to the intervention and finally increase the success rate on achieving a healthier life style.¹¹

We then followed all participants without randomization. They were later categorized into three groups: regularly, occasionally and rarely attended the LSMC. This was based on the assigned exercise and workshop scores which had been defined before the study started. At the end of the observation, we compared the HSRs of each category in order to demonstrate the effectiveness of the LSMC.

Diagram 1. Flow of participants through each stage.



		BMI		SBP		WHC		SFM		HG		BF		CRF	
		Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Rarely 30.6%	Mean (SD)	25.29 (3.97)	25.13 (4.04)	132.66 (18.71)	124.34 (16.53)	89.0 (10.93)	86.56 (10.24)	32.86 (5.43)	31.40 (5.81)	4.06 (2.14)	4.46 (2.38)	7.89 (4.43)	7.89 (4.43)	26.50 (5.94)	26.86 (5.64)
	P value	0.30		0.001*		<0.001*		0.001*		0.147		1.00		0.70	

* Positive effect of the LSMC with statistical significant $P < 0.05$; *body mass index (BMI)*, *systolic blood pressure (SBP)*, *waist-hip circumference ratio (WHC)*, *skin fold measurement (SFM)*, *hand grip strength (HG)*, *body flexibility (BF)* and *cardio-respiratory fitness (CRF)*

The study demonstrates that the group that completely participated in the LSMC regularly achieved statistically significant improvement on most components of the HSR. On the other hand, the occasionally attended group as well as the rarely attended group achieved statistical significant improvement in only 3 out of 7 components of HSR. The study confirms that the LSMC is an effective strategy and individual commitment to attend a life style modification program played a major role to achieve a better overall health status. The particular program appears to work well in reduction of WHC, SFM and SBP but not so well on increasing BF and HG.

The reader should also be aware that LSMC was a totally voluntary program. Subjects did drop out as time went by and there were only 477 of the 1,850 that completely attended the LSMC and were included in this study. In addition, the assigned exercise and workshop scores that categorized LSMC participants into 3 groups were solely calculated from self report questionnaires which could possibly contribute a significant bias.

Even though the LSMC was an example of a combined extensive strategy, still it might not be considered as the best. As we can see from this study, only a small number of PEOs who were interested and voluntarily enrolled in the LSMC since the start remained at the end of the program. Without performing a decision analysis, it is also hard to conclude that this type of campaign is cost effective for the investment in health for an organization.

The LSMC has been specifically designed for a large organization as a pilot health intervention program. A future campaigning strategy could be built upon this study; for example, to consider adding up some more exciting activities, or the program that concentrated on increasing BF like Yoga.¹² An organization might consider taking strong action and implementing regular exercise as a required performance in order to qualify for a promotion, rather than allowing voluntary choice, to make sure that everyone complies with the campaign, and most importantly sets healthy life as their priority.

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