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Comparing the Effectiveness of Health Program in Thailand and Japan

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Abstract

Objective: This study aimed to establish appropriate health education in Thailand to compare the health education of Thailand and Japan.

Method: Participants in Salaya, Thailand, totalled of 24 people aged 69.1 ± 6.6 years, whereas participants in Minowa, Japan totalled 46 people aged 62.7 ± 4.7 years. Implementing the health program lasted 6 months in Salaya and 10 months in Minowa. We measured the energy expenditure using a pedometer and implementing Go/No-Go task for the brain function test and physical fitness tests in the before and after this period.

Results: The results of Salaya showed the average walking steps were 4,012. As for Minowa, the average walking steps were 8,644. In Minowa, the Go/No-Go task number of error responses significantly decreased after the program, although Salaya was not significantly different. As for Salaya, the results for grip strength and sit ups significantly decreased after the program, whereas 6-minute walk significantly improved. In Minowa, the results of the handgrip strength, sit ups, sit-and-reach flexibility, 10-meter obstacle walk, and the 6-minute walk significantly improved after the program. The handgrip strength and sit ups of Minowa showed a significant difference from those of Salaya.

Conclusion: By doing the 90-minute strength and weight training once a week in Minowa the participants may have encouraged one another to a superior number of walking steps, and better rest results on the Go/No-Go task and the physical fitness tests compared with those of Salaya.

Keywords: Health education; Pedometers; Go/No-Go task; Physical fitness

Introduction

A Canadian politician Marc Lalonde declared that the focus of public health was going to be shifted from disease prevention to health promotion in 1974 [1]. A new national policy for health promotion, catch-phrased "Healthy People", was enacted to change the core philosophy of medicine from advanced treatment to primary health care, with more emphasis on prevention. In 1986, the American government designated a city government which contributed to health promotion in a local area, whose name was called "healthy city" [2]. The Japanese government also enacted a national policy, "Kenkko Nippon 21" with more focus on the decrease in death rate for the middle-aged, the extension of life span, the improvement of quality of life, and primary care and prevention [3]. In 2002, the Japanese government enacted a developed version of the health-promotion law, which imposes demand for a health-promotion policy on each prefecture and a conscious effort for the local policy on every city. The Japanese Ministry of Health, Labour and Welfare introduced an idea for a national policy to improve the prevention and treatment for metabolic syndrome, which will plan to start charging a penalty to the National Federation of Health Insurance Societies in 2013 in case residents do not meet preventive criteria for the syndrome. This economic pressure seems to have encouraged the practice of health education at a national, state, and local city level [4].

An active health program, developed by the Japanese authors, is implemented by measuring energy expenditure and conducting the blood test, the brain function test, and the physical fitness test as well as providing educational seminars regarding exercise and nutrition, and recreational activities such as hiking and cooking. The practice of health education in Thailand usually includes monthly meetings with club members, periodic seminars to develop participants' leadership, with Yoga and stretch exercise as well; however, a lack of systematic evaluation after a program seems to make it difficult for Thai's health practitioners to decide the effectiveness of a health program.

This study aimed to establish appropriate health education in Thailand to compare the health education of Thailand and Japan.

In particular, it can be beneficial to share the health promotion in Minowa with other cities and countries because Nagano prefecture including Minowa has been one of the national longevity areas over the last decades. Since Japan was the world's highest longevity country in 2005, Minowa is expected to be one of the world-class areas where the longevity is foreseen.

Method

General methods

The authors implemented a 6-month health program from Sep 2011 to Feb 2012 in the district of Salaya in Bangkok. This program was the latest version developed by the authors in Japan, which measures the energy expenditure by pedometers, and tests the brain function and physical fitness. The authors originally planned to practice the health program once a month in Salaya, but the only four times program was possible due to the flood that damaged the district from Nov 2011 to Feb. The participants in Salaya performed the following recreational activities: modified Boonmee long stick exercise on balance, health education on blood pressure, Thai Yoga and walking exercise (Table 1). In Salaya, 72 elderly aged 67.8 ± 8.0 years (Mean ± SD) initially participated in the program, but only 7 men aged 69.9 ± 5.6 years and 17 women aged 69.6 ± 6.6 years, for a total of 24 people aged 69.1 ± 6.6 years completed the program due to the flood. The 10-month health program was concurrently implemented in Minowa, Japan from May 2011 to February 2012. In Minowa, a total of 46 people aged 62.7 ± 4.7 years participated in the program. However the persons who participated till the last were the 20 elderly men aged 64.3 ± 4.5 years and 24 elderly women aged 60.8 ± 3.9 years, total 44 aged 62.3 ±4.5 years. The participants in Minowa also took a series of recreational activities: walking exercise, Tai Chi Chuan, nature tour, cooking practice, medical seminars on blood pressure, mouth care, nutrition balance and performed 90-minute strength and weight training once a week (Table 1).

The latest guideline of the Helsinki Declaration was adopted by the Institutional Ethics Committee of Mahidol University(Mahidol Univ. IRB: 01-58-10) and Shinshu University (UMIN000009309). Written informed consents were obtained from Salaya and Minowa elderly people.

Month	Salaya program	Minowa program
5		The measurement before the health education, distribution of the pedometer and training once a week
6		Lecture on the importance of health and training once a week
7		Practical recreation and training once a week
8	The measurement before the health education, distribution of the pedometer	Hiking and training once a week
9	Cannot carry out the program because of floods	Lcture on nutrition and training once a week
10	Cannot carry out the program because of floods	Practical walking and training once a week
11	Modified Boonmee long stick exercise on balance	Lecture on blood pressure and training once a week
12	Health education on blood pressure	Lecture on dental health and training once a week
1	Thai Yoga	Tai Chi Chuan and training once a week
2	Walking exercise and the measurement after health education	The measurement after health education and training once a week

Table 1: Program contents of the health education in Salaya and Minowa

Pedometer

The number of walking steps and the amount of energy expenditure were measured during the Aug 2011 to Feb 2012 in the Salaya and May 2011 to February 2012 in Minowa. The weight Bering Index (WBI) gave the approximate number of daily walking steps [5]. A recent model (Acos Inc., FS50) enabled it to transfer the saved data from the pedometer to a personal computer. The pedometer measured the number of walking steps when a participant walked more than 4 METS. Participants reported their results to a project leader when participants gathered for a monthly meeting.

The Go/No-Go task

The Go/No-Go task [6] was used in order to estimate as a battery test the inhibitory decision process [7] and dementia process [8] in prefrontal cortex, whose task consisted of three experimental stages: formation, differentiation, and reverse differentiation. First, in the formation stage, participants were instructed to squeeze a rubber ball in response to a red light. Second, during the differentiation stage, they squeezed a rubber ball in response to a red light, but not a yellow light, when a red or yellow light was randomly displayed. Third, during the reverse differentiation stage, participants squeezed a rubber ball in response to a yellow light but not a red light. In each of the differentiation and reverse differentiation stages participants completed 20 trials. Red and yellow lights were equally likely to be displayed 10 times each. In this paper, the term “forget” indicates an incorrect response when participants did not squeeze a rubber ball when it is to be squeezed. On the contrary, the term “mistake” means an incorrect response when participants did squeeze a rubber ball when it was not supposed to be squeezed.

Physical test

The physical tests approved by the Japanese Ministry of Education, Culture, Sports, Science and Technology [9] were composed of six physical assessments: grip strength, sit ups, sit-and-reach flexibility,

single leg stance, 10-meter obstacle walk and a 6-minute walk. The participant's physical ability was assessed before and after the health program.

Statistical Analysis

The paired-t test was used to compare the results before and after participating in the health program. Another factor of place (Salaya vs. Minowa) was analyzed by Two- way repeated measure ANOVA. The walking steps for these two places were compared by the independent t-test. The 18th version of SPSS was used for the analysis.

Result

The number of walking and exercise steps

The subjects were 24 elderly people aged 69.1 ± 6.6 years in Salaya and 44 elderly people aged 62.3 ±4.5 years in Minowa. Figure 1 showed the average walking steps and exercise steps in each month when the speed was defined as more than 4 METS. In Minowa, the average walking steps and exercise steps gradually increased from May to October. Walking steps and exercise steps of October showed 9382.6 ± 512.6 and 6141.7± 467.0, respectively. However, both walking and exercise steps decreased from November to February. Walking steps and exercise steps of February showed 7991.4 ± 517.1 and 5515.7± 489.3, respectively. In Salaya, the average walking steps and exercise steps in August were fewer than those in the other months. Walking steps and exercise steps of August showed 1460.1 ± 233.1 and 640.4± 84.2. However, those numbers of steps increased after October to 4993.7 ± 175.6 and 2140.1± 90.7 (Figure 1).

As shown in Table 2, the Salaya results showed that the mean walking steps were 4011.7 ± 190.1, whereas the mean exercise steps were 1700.9 ± 96.4. The Minowa results showed that the mean walking steps were 8648.0 ± 165.7 whereas the mean exercise steps were 5482.3 ± 148.3. In Minowa, the average walking steps (t=11.8, p > 0.000) and exercise steps (t=-3.9, p > 0.002) showed significant increase, compared with those of Salaya (Table 2).

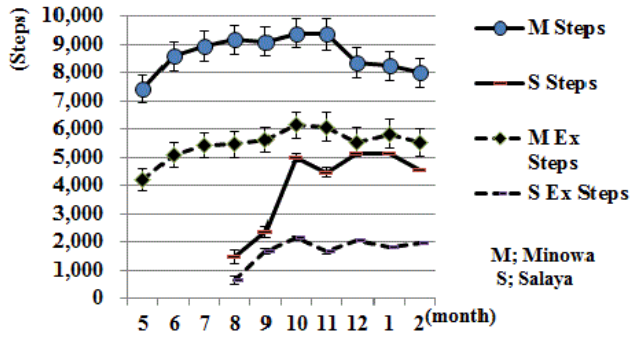

Figure 1: Walking steps and exercise steps

		Salaya		paired	Minowa		paired	2 way ANOVA
		Before	After	p-value	Before	After	p-value	p-value
Response time of Go/No-Go task (ms)								
Formation		295.1 ± 18.3	341.2 ± 29.8	NS	256.6. ± 8.4	244.1 ± 5.5	NS	*
Differentiation		442.5 ± 23.8	399.3± 12.9	NS	403.1 ± 8.7	382.1 ± 9.4	NS	NS
Reverse Differentation		432.5 ± 16.2	410.6 ± 14.9	NS	430.3 ± 10.4	414.5 ± 11.0	NS	NS
Total		390.1 ± 14.6	383.7 ± 14.4	NS	387.3 ± 7.6	368.9 ± 8.3	*	NS
The number of error response (times)								
Differentiation	Forget	0.6 ± 0.3	0.2 ± 0.1	NS	0.1 ± 0.0	0.1 ± 0.1	NS	NS
	Mistake	3.7 ± 0.5	3.0 ± 0.4	NS	2.2 ± 0.3	1.3 ± 0.2	***	NS
Reverse Differentation	Forget	0.9 ± 0.2	0.6 ± 0.2	NS	0.1 ± 0.0	0.2 ± 0.2	NS	NS
	Mistake	3.2 ± 0.3	2.6 ± 0.4	NS	0.9 ± 0.2	0.6 ± 0.2	NS	NS
Total	Forget	1.5 ± 0.4	0.8 ± 0.2	NS	0.1 ± 0.0	0.2 ± 0.2	NS	NS
	Mistake	6.9 ± 0.7	5.6 ± 0.8	NS	3.0 ± 0.4	1.9 ± 0.3	***	NS
	Both	8.4 ± 0.9	6.5 ± 0.9	NS	3.1 ± 0.4	2.1 ± 0.4	*	NS
Physical fitness test								
Handgrip strength (kg)		22.6 ± 1.7	20.4 ± 1.5	*	33.6 ± 1.5	37.3 ± 1.5	***	NS
Sit-up (times)		4.1 ± 1.0	1.8 ± 0.9	*	11.9 ± 0.9	15.3 ± 0.9	***	**

Sit and reach flexibility (cm)		31.2 ± 1.9	33.3 ± 2.0	NS	42.6 ± 1.3	47.4 ± 1.1	***	NS
Eyes open single leg stance (sec)		22.6 ± 6.2	25.2 ± 8.6	NS	106.0 ± 4.5	105.7 ± 4.5	NS	NS
10-meter obstacle (sec)		11.5 ± 1.0	9.7 ± 0.3	NS	6.8 ± 0.1	5.1 ± 0.1	***	NS
6-minute walk (m)		454.3 ± 11.5	493.5 ± 14.9	**	622.2 ± 7.3	719.9 ± 9.2	***	**
Walking								
Walking/day (steps)		4011.7 ± 190.1			8648.0 ± 165.7		***	
Exercise /day (steps)		1700.9 ± 96.4			5482.3 ± 148.3		**	

Table 2: Results before and after the health program in Salaya and Minowa, (Mean ± SE, NS: not significant, : p<0.05, : p<0.01, : p<0.001)

Go/No-Go tasks

In Minowa, the reaction time became significantly shorter in total ($t = 2.3$, $p < 0.05$) after the health program. As for the number of errors for Salaya, there were no significant differences before and after the health program in the three stages of experiment, although in Minowa, the number of errors for mistake of differentiation ($t = 4.1$, $p < 0.000$), total of mistake ($t = 3.7$, $p < 0.001$) and both of total forgot and mistake ($t = 2.5$, $p < 0.016$) was statistically significance. The Go/No-go task results were compared between the before and after program for Salaya and Minowa. The reaction time for the formation stage ($F = -4.0$, $p < 0.05$) was significantly longer in Salaya than Minowa. As for the number of errors, there was no significant difference between Salaya and Minowa (Table 1).

Physical strength test

The Salaya showed that the grip strength ($t = 2.2$, $p < 0.043$) and sit-ups ($t = 2.1$, $p < 0.049$) significantly decreased after the participants joined the health program. In contrast, the distance of 6-minute-walk ($t = -3.2$, $p < 0.005$) significantly increased after the program. As for the result of Minowa, the grip strength ($t = -7.4$, $p < 0.000$), sit ups ($t = -6.7$, $p < 0.000$), sit-and-reach flexibility ($t = -8.6$, $p < 0.000$), 10-meter obstacle walk ($t = 17.3$, $p < 0.000$) and 6-minute walk ($t = -13.4$, $p < 0.000$) significantly improved performance after the program. The sit ups ($F = 7.8$, $p < 0.01$) and 6-minute walk ($F = 7.6$, $p < 0.001$) of Minowa showed a significant difference than those of Salaya (Table 1).

Discussion

The number of walking steps during the health program

During the health program, a few studies showed that participants with pedometers walked for a longer distance for a longer time than those without pedometers [10,11]. For instance, participants wearing pedometers showed significantly longer walking time than those without pedometers [12]. In this study, wearing pedometers might have also helped to increase their walking distance and time. From a perspective of health education, it is important to encourage participants to increase the quality and quantity of exercise [13]. An additional, educational intervention is necessary to improve the quality of future programs.

The average walking steps and exercise steps of Minowa gradually increased from May to October, whereas those averages decreased from November to February. This decreased number of walking steps is probably due to the difficulty of walking in the cold, snowy winter in Minowa. On the other hand, in Salaya, the average walking steps and exercise steps in August were fewer than those in other months. However, the numbers of walking steps returned to 4000 to 5000 steps after October. This temporary decrease of walking steps in August is probably because they were unable to walk outside due to the flood that devastated the region. It is unclear why the walking steps in Salaya did not increase more than 4000 to 5000 steps even though the walking steps in Minowa consistently 8000 to 9000 steps. Even if the flood prevented people in Salaya from walking outside, the number of walking steps may suggest their daily average number of walking steps. We need to determine their average walking steps when it is not affected by the flood. On the other hand, this result will become the precious document of the Thai population at the time of the flood.

Physiological and behavioral studies inferred from the Go/No-Go task

The origin of Go/No-Go task presumably dates back to the Pavlov's well-known conditioning experiment which uses the sound of bells, whose concept was developed into the stimulus of light. The dysfunction of the prefrontal cortex is presumably associated with the conditioning response [14].

Sasaki et al [15] reported No-Go potential appears when it is not allowed to grasp a rubber ball, was found from monkeys and humans in the lateral prefrontal cortex. This outcome seems to be related to the area of 46 which plays a crucial role in working memory [16].

We used the go/no-go task as investigation about the development of the brain function of the child [7]. It is reported that go/no-go task could apply to investigation of the brain function for screening test of the dementia [8]. The previous study [17-19] of the Go/No-Go experiment reported that the reaction time became faster and the number of error responses became fewer when participants continue to exercise for 10 months with the average of 7,000 steps a day. The two-year continuation of this walking exercise seems to speed up the reaction time and decrease the number of error responses. The results of Salaya and Minowa showed that the average reaction time of the Go/No-Go task became faster after the program. As for the number of errors for Salaya, there were no significant differences before and after the health program, although in Minowa, the number of errors for mistake of differentiation, total of mistake and both of totals forgot and mistake decrease was statistical significance. These results suggest that in Minowa the brain function including working memory is better than Salaya after the program.

Physical fitness test

The practice of physical measurement differs from country to country. There are two types of exercise programs in Japan. One [4,20] comprises six physical tests to increase functionality of the motor system: hand grip strength, muscle strength in the lower extremities, functional reach test, eyes-open single leg stance, timed up & go test, 5m-normal-and-maximal walk. This Physical fitness test for the care for the aged is recommended by the Ministry of Health, Labour and Welfare. The other [7,21] comprises six physical tests designed for healthy elderly people is recommended by the Ministry of Education, Culture, Sports, Science and Technology : hand grip strength, sit ups, sit-and-reach flexibility, single leg stance, 10-meter obstacle walk and 6-minute walk. We have chosen this Physical fitness test for healthy elderly people.

In Minowa, the five physical fitness tests significantly improved after the program. The results of Salaya showed that the grip strength and sit-ups significantly decreased after the participants joined the health program. In contrast, the distance of a 6-minute-walk significantly increased after the program. The smaller increments of improvement in Salaya may be explained by several reasons. One is the two-month flood that devastated the region, which made participants unable to perform the amount of exercise. The results of Salaya, however, showed that the 6-minute-walk improved after the program. This improvement may be due to the procedural difference of the 6-minute-walk; that is, it was measured in an indoor, small gym before the program, but was measured in a bigger, spacious gym after the program. Using similar facilities for implementing these physical fitness tests would be important for future studies. The sit ups and 6-minute-walk tests of Minowa showed significant differences from those of Salaya. Reflection on some of these may make it clear that the muscle weakness of the Salaya people was caused by the two-month flood that devastated the region.

The superior number of walking steps in Minowa may reflect better performance of the Go/No-Go task as well as better results on the physical fitness tests compared with those of Salaya. The flooding in Salaya might have been a factor in decreasing the improvement of test results.

Conclusion

This study aimed to establish a health program in Thailand and assess the effectiveness of both Thailand and Japan. Participants in Salaya, Thailand, were a total of 24 people aged 69.1 ± 6.6 years, whereas participants in Minowa, Japan were a total of 46 people aged 62.7 ± 4.7 years. Implementing the health program lasted 6 months in Salaya and 10 months in Minowa.

The average walking steps and exercise steps of Minowa gradually increased from May to October, whereas those averages decreased from November to February. On the other hand, in Salaya, the average walking steps and exercise steps in August were fewer than those in other months. However, the numbers of walking steps returned to 4000 to 5000 steps after October.

The results of Salaya and Minowa showed that the average reaction time of the Go/No-Go task became faster after the program. As for the number of errors for Salaya, there were no significant differences before and after the health program, although in Minowa, the number of errors for mistake of differentiation, total of mistake and both of total forgot and mistake decrease was statistical significance. These results suggest that in Minowa the brain function including working memory is better than Salaya after the program.

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