

## 高齢者の運動継続が体力・脳機能に及ぼす影響 The continuous exercises of the elderly have good influence on physical strength and the brain functions

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**Key words:** the elderly, continuous exercise, pedometer, physical strength, brain functions

### Abstract

#### Purpose:

The practice of moderate exercises for the elderly is suggested to lead to the positive health. However, the continuation of exercises is difficult. Therefore, the local administration cooperated with a university held the course of health programs (lectures and exercises) for 1 year, and supported them for their implementation. And we studied about the effects of these continuous exercise of the elderly in this course by the test of the physical strength and the of brain function.

#### Method:

The subjects were 45 persons, and the average was  $68 \pm .2$  years old. This course was held from May 2009 to March 2010 once a month. The course's contents were lectures, some sports and the guidance of daily exercise in home. The subjects were measured the daily steps by the pedometer. We classified into 5 Groups by the result of their steps. Before and after this course, the test of the physical strength (flexibility, balance, the 10 m obstacle walk, 6 minutes run and grips strength) and the brain function (the GO/NO-NO test). were measured.

#### Result:

The average of steps/day was 4798 steps, the minimum was 693 steps and the maximum was 7776 steps. The number of group A (under 4,000 steps) was 12 persons, B group (4000-4999 steps/day) was 10 persons, C group (5000-5999 steps/day) was 12 persons, D group (6000-6999 steps/day) was 6 persons, and E group (more than 7,000 steps/day) was 5 persons. As the result of the physical strength test, C, D and E groups in the 10 m obstacle walk, D, E groups in 6 minutes run had improvement significantly. As the measurement of the brain function, we used the reflex time by the visual discrimination tasks (VDT) with Go/No-Go task. In the group A (under 4,000 steps/day), the averaged of the reflex time was significantly shorter. In the group C (5000-5999 steps/day), the ability of differentiation of "grasped mistakes" in the VDT decreased significantly.

Table 1. The Characters of Subjects

	Ago (years)		Height (cm)			Weight (kg)		BMI	
	n	M	M	SD	M	SD	M	SD	
male	12	71	165.3	6.41	64.2	8.71	21.9	6.7	
female	33	67	154.5	5.26	55.3	7.12	23.3	5.9	
total	45	68	155.3	6.6	53.6	7.4	22.3	6.1	

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**Table 2. The Average Steps in a day**

	N	M(steps)	S.D	T
male	12	4,711.05	1,940.1	N.S
female	33	5,188.8	1,938.4	N.S
total	45	5,061.0	1,907.0	N.S

**Table 3. The Results of Physical Strength**

		Male			Fwfemale			Total		
		Mean	S · D	P	Mean	S · D	P	Mean	S · D	P
Grip Strength (kg)	Pre	37	6.6	N.S.	25	4.5	N.S	28.5	7.4	NS
	Post	37	6.1		25	5.4		28.7	7.6	
Upper part of the causing (Times)	Pre	8.9	5.6	N.S.	9.7	6.2	N.S	9.7	6.0	*
	Post	12	5		11	6.2		11.0	5.8	
Sit and Reach (cm)	Pre	41	12	N.S	46	7	**	44.4	8.8	*
	Post	41	9.4		41	11		41.0	10.5	
One foot Standing with One eye opened (seconds)	Pre	79	51	N.S	79	47.7	N.S	78.9	48.0	*
	Post	86	43		87	46.6		86.3	45.0	
6 Minutes Walk (m)	Pre	586	64	N.S	599	53.2	N.S	595.7	55.6	N.S
	Post	595	74		578	171		582.4	151.0	
10 m tacle Wa (seconds)	Pre	7	1	N.S	6.9	1.4	**	6.9	1.3	*
	Post	6.8	1.2		6.6	1.1		6.7	1.1	

\*P<0.01    \*\*P<0.05

**Table 4. The Results of GO/NO-GO Test**

		Male			Fwfemale			Total		
		Mean	S · D	P	Mean	S · D	P	Mean	S · D	P
Task time (ms)	Pre	258	32		280	62		273.8	55.7	
	Post	241	45.7		272	67.5		263.3	63.1	
The Reflex Times of the VD T (ms)	Pre	440	56.7	*	425	63.1	**	429.1	61.1	**
	Post	401	60.8		386	44.1		389.9	49.0	
The Reflex Times of the R · VDT (ms)	Pre	435	65.5		453	67.3	**	448.1	66.5	**
	Post	415	35.9		390	49.3		369.9	46.9	
The Reflex Times (ms)	Pre	378	44.7		386	48.7	**	383.7	47.1	**
	Post	352	40.6		349	42.9		350.0	48.8	
Total Errors (times)	Pre	2.9	1.6		2.4	2.3		2.5	2.1	
	Post	4.8	7.5		2	2.5		2.4	3.8	

\*P<0.01    \*\*P<0.05

Figure 1. 6 Minutes Walk

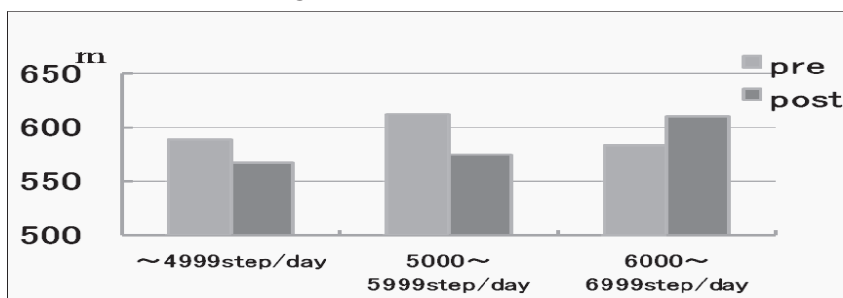
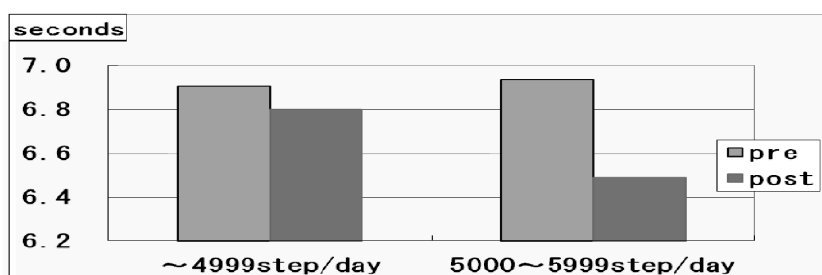
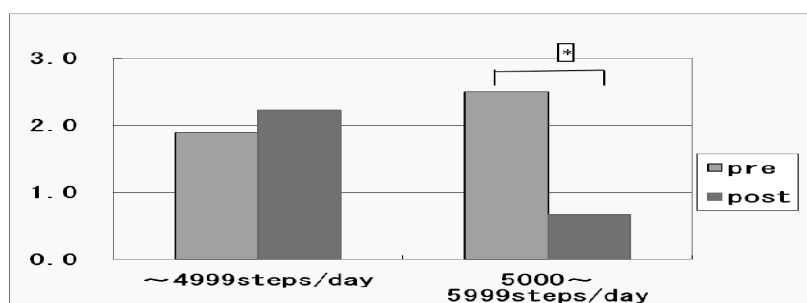


Figure 2. 10 m Obstacle Walk



By the result of the physical strength test, D, E groups (over 6000 steps/day) in 6 minutes run had improvement significantly (Figure 1). The averaged times of every group in 10 m obstacle walk were shortened, especially there were differences between the pre-averaged values and post significantly in C, D and E (over 5000 steps/day) groups (Figure 2).

Figure 3. The Number of Errors in the VDT



The averaged numbers of differentiation “grasped mistakes” in the VDT were decreased in C, D and E groups (over 5000 steps/day) significantly (Figure 3).

**Conclusion:**

As the result, Almost the elderly took this course had more than 3000 steps in a day. Generally the elderly tends to take under 3,000 steps in a day. These results means the elderly of this health course could have more exercise in daily life. In addition, the group C, D and E (more than 5,000 steps/day) were seen to the maintenance and improvement in the brain function, and the groups D and E (over 6,000 steps/day) had the improvement of physical strength. We are suggested that over 6000 steps/day lead to the healthy life.