

## Effect of Therapeutic Recreation Dance Movement on Physical Fitness, Body Composition and Serum Lipids of Elderly People

Sung-Sup Han\*, Jong-Woo Yeom and Yeong-Ho Baek†

Department of Physical Education, Pusan National University, Pusan 609-735, Korea

\*Sewha High School, Jeju 695-804, Korea

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**Abstract** We conducted this study to analyze the effectiveness of a treatment called 12-week therapeutic recreation dance movement (TRDM) to elderly people in terms of health care and recovery. Forty two elderly people were participated in this study and divided into two groups with healthy (twelve) and unhealthy (thirty). After TRDM treatment, the muscular power was increased in both groups without statistical significance within and between groups. The flexibility, agility and balance were slightly increased in both groups. Although the elevation of muscular endurance was not significant between groups, it was statistically meaningful within groups. The results of body composition comparison did not reveal meaningful difference within and between groups. However, the amount of fat in serum and fat distribution percentages were decreased in both groups. Both group appeared to be increased muscle mass. The level of body water was decreased in healthy group and increased in unhealthy group. Unhealthy group appeared to be decreased level of T-C, TG and LDL-C. In contrast, the unhealthy group revealed the increased level of HDL-C.

These results demonstrate the effect of TRDM to elderly people. This effectiveness can be adapted for the protection and treatment of geriatrics-related adult diseases such as diabetes, hypertension and hyperlipidemia.

**Key words:** Therapeutic recreation dance movement (TRDM), Muscular endurance Physical fitness, Body composition, Serum Lipids.

### Introduction

Medical development, good nutrition and improved environment extend human's average span of life. Along with the increased number of elderly people, the number of elderly people carrying chronic disease is growing. Many chronic

disease carrier hold the cardiovascular problem or the declining of physical fitness. The sickly long life causes a heavy social problem. The maintenance of adequate physical fitness is needed for an ideal quality of life, which is necessary for a healthy long life.

Several reports regarding the health of elderly people described that the reduced amount of body fat and improvement of physical fitness and cardiorespiratory endurance are required for the high quality life. Therefore, regular basis physical activities are necessary for the aged society and give a great effect on health maintenance and delayed aging processes.

Therapeutic recreation dance movement (TRDM) has not been designed just for teaching dance. Recreation-added dance provides therapeutic function against physical trouble and it plays a role to maintain and increase the health with physical activities.

In order to investigate the relationships of aging, maintenance and increase of health and improvement of life quality, the TRDM was employed to elderly people to examine the changes of physical fitness, body constituent and serum lipids.

### Materials and Methods

#### Subject of experiment

The subjects for this experiment were 42 men who were divided into 30 men of health hazard group carrying adult diseases and 12 men of healthy group. All were living in the P city. The TRDM performance was applied to measure the effects on the physical fitness, the body constituent and the serum lipids. The characteristics of research subjects showed in Table 1.

#### Tests for physical fitness

Grasping power, flexibility and agility were examined using hand dynamometer, trunk flexion and stick measurement, respectively. Endurance testing was done by measuring the number of sit-down and stand-up on chair during 20 second.

†Corresponding author

Phone: 82-51-510-2719, Fax: 82-51-515-1991

E-mail: yhobaek@pusan.ac.kr

**Table 1.** Characteristic of subjects

Group (N)	Age (M±SD)	Height (M±SD)	Weight (M±SD)	HR (M±SD)
Health (n=12)	67.75±4.57	158.04±10.12	60.07±8.26	73.92±6.84
Unhealth (n=30)	67.05±4.80	157.70±10.09	60.28±8.75	76.57±9.28

The balance was estimated by standing on 3 cm bar-stick with one leg for one hour.

### Examination of body composition

The height was measured by anthropometer. The body weight, body water, muscle mass, body fat mass and abdominal fat mass were measured by body constituent analyzer which is performed basis on the electrical resistance.

### Examination of blood

Blood constituents were analyzed for serum lipids including T-C, TG, HDL-C and LDL-C. Ten 10 ml blood samples were obtained from cubital vein before and after exercise during 12 hours. Following centrifugation, the serum was removed from the whole blood. The serum lipids were analyzed with the use of blood constituent automatic analyzer (Cell Dyn 3000, USA).

### Data analysis

The statistical analyses were performed using the SAS program to calculate the average and the standard deviation. The average tests before and after exercises in the group was analyzed by paired t-test, and the average tests between groups were calculated by one-way ANOVA test. The significant tested level is  $\alpha=0.05$ .

## Results and Discussion

### Changes of physical fitness

After TRDM treatment, we measured the muscular power. There was a little increase in muscular power in both groups, even though the difference is not statistically meaningful (Table 2). The healthy group was increased from 23.75±9.46 to 25.50±9.12 kg and the unhealthy group was from 25.15±8.49 to 26.02±9.47 kg. The increasement was 1.75 and 0.87 kg for healthy and unhealthy groups, respectively.

**Table 2.** Changes of muscle strength on TRDM

Group	test	diff	t	p
Health (n=12)	pre 23.75±9.46			
	post 25.50±9.12	1.75		
	t -0.46		0.83	0.41
Unhealth (n=30)	pre 25.15±8.49			
	post 26.02±9.47	0.87		
	t -0.38			

\*0.05, \*\*0.01, \*\*\*0.001

After TRDM treatment, the flexibility was increased a little, even though the value was not meaningful statistically (Table 3). The healthy group was increased from 121.67±53.16 to 130.58±72.40 mm and the unhealthy group was increased from 102.81±73.17 mm to 134.13±61.43 mm. The former increased up to 8.91 mm and the latter was up to 31.32 mm.

Results of the balance and the agility were shown in Table 4 and 5. There was a little increase in balance. The balance in healthy group increased up to 1.26 sec. whereas unhealthy group was up to 1.93 sec. The agility was increased in both groups without statistical significance (Table 5).

The results of muscular endurance were shown in Table 6. Interestingly, both groups showed meaningful increasement within each group.

These results suggest that physical fitness is an important factor for the movement function which is a necessary factor for the elderly people. In consequence, elderly people need physical fitness for their healthy and pleasure life.

It has been reported that the decrease of walking speed in mid-aged women was highly correlated with the declining of neuromuscular function such as muscle strength, power, agility and flexibility.

**Table 3.** Changes of flexibility on TRDM

Group	test	diff	t	p
Health (n=12)	pre 121.67±53.16			
	post 130.58±72.40	8.91		
	t -0.34		-1.46	0.15
Unhealth (n=30)	pre 102.81±73.17			
	post 134.13±61.43	31.32		
	t -1.83			

\*0.05, \*\*0.01, \*\*\*0.001

**Table 4.** Changes of balance on TRDM

Group	test	diff	t	p
Health (n=12)	pre 7.79±6.50			
	post 9.05±8.45	1.26		
	t -0.41		-0.17	0.86
Unhealth (n=30)	pre 3.90±2.80			
	post 5.83±4.74	1.93		
	t -1.95			

\*0.05, \*\*0.01, \*\*\*0.001

**Table 5.** Changes of agility on TRDM

Group	test	diff	t	p
Health (n=12)	pre 20.33±8.56			
	post 22.17±9.78	1.84		
	t -0.49		-0.22	0.83
Unhealth (n=30)	pre 17.85±6.86			
	post 20.45±8.17	2.6		
	t -1.36			

\*0.05, \*\*0.01, \*\*\*0.001

**Table 6.** Changes of muscular endurance on TRDM

Group	test	diff	t	p
Health (n=12)	pre	13.75 ± 2.80		
	post	18.17 ± 3.13	4.42	
	t	-3.64**		
			0.54	0.60
Unhealth (n=30)	pre	12.35 ± 2.89		
	post	16.87 ± 4.03	4.52	
	t	-5.01***		

\*0.05, \*\*0.01, \*\*\*0.001

Cho [2] reported that regular basis exercise changes physical fitness for the elderly people. Flexibility was changed at the significant level in his study. However, there was no significant effect on muscle strength, muscle endurance and improvement of power.

This study also shows that there is no significant differences between the test groups regarding physical fitness. However, the paired t-test for before and after experiments results in significant difference in the muscular endurance. Furthermore, muscular endurance, flexibility and balance were increased with lack of significance. Similar results were presented in other studies [2,6,8].

### Changes of body composition

We measured the changes in body fat mass and abdominal fat mass after TDRM. There was no statistically meaningful difference (Table 7,8).

The changes of the muscle mass and the body water were not significant (Table 9,10).

Hinklemann *et al.* [4] investigated the effect of walking on body composition and serum lipids in women with randomly divided two groups; one for exercise group (n=18) and

**Table 7.** Changes of %fat on TRDM

Group	test	diff	t	p
Health (n=12)	pre	30.73 ± 8.64		
	post	27.30 ± 8.75	-3.43	
	t	0.97		
			-0.90	0.37
Unhealth (n=30)	pre	30.59 ± 6.19		
	post	27.96 ± 6.78	-2.63	
	t	1.60		

\*0.05, \*\*0.01, \*\*\*0.001

**Table 8.** Changes of fat distribution on TRDM

Group	test	diff	t	p
Health (n=12)	pre	0.94 ± 0.05		
	post	0.92 ± 0.05	-0.02	
	t	0.95		
			0.21	0.83
Unhealth (n=30)	pre	0.94 ± 0.04		
	post	0.92 ± 0.04	-0.02	
	t	1.99		

\*0.05, \*\*0.01, \*\*\*0.001

**Table 9.** Changes of muscle mass on TRDM

Group	test	diff	t	p
Health (n=12)	pre	38.86 ± 6.23		
	post	39.74 ± 5.73	0.88	
	t	-0.36		
			-0.44	0.70
Unhealth (n=30)	pre	39.76 ± 7.78		
	post	40.82 ± 8.42	1.06	
	t	-0.52		

\*0.05, \*\*0.01, \*\*\*0.001

**Table 10.** Changes of body water on TRDM

Group	test	diff	t	p
Health (n=12)	pre	28.78 ± 4.37		
	post	28.32 ± 5.45	-0.46	
	t	0.23		
			-1.45	0.17
Unhealth (n=30)	pre	29.18 ± 5.75		
	post	29.89 ± 6.10	0.71	
	t	-0.47		

\*0.05, \*\*0.01, \*\*\*0.001

another for non-exercise group (n=18). The exercise group performed fast-walking ( $62 \pm 2\%$   $\dot{V}O_2$ max during 45 min.) at five times per week during 15-week period. The changes of weight between exercise group and non-exercise group were significantly different. However, the amount of body fat was not significantly changed ( $p < .001$ ).

Yu *et al.* [10] reported that aerobic exercise with the supplement of calcium supplement affect on lipid metabolism in postmenopausal elderly women (average age  $63.6 \pm 1.3$ , exercise group including 8 women, control group including 7 women). The % fat of before and after exercise was  $31.0 \pm 1.9\%$  and  $26.6 \pm 2.5$  in control group and  $36.6 \pm 2.1\%$  and  $31.3 \pm 1.9\%$  in exercise group. This result indicates that the aerobic exercises reduce the body fat for elderly women.

Kim *et al.* [8] examined the effect of aerobic dance for elderly people during 10-week period to see the changes in respiratory cycle function, body composition, flexibility, muscular strength and muscular endurance. The body composition was not significantly different within and between groups. The body fat rate and abdominal fat rate were decreased in both healthy and unhealthy groups, whereas the muscle mass was increased. Additionally, the amount of body water was reduced in the healthy group whereas it was increased in the unhealthy group. These results were consistent to other researches [4,8,10].

Therefore, TRDM may affect on the improvement for the elderly people's health.

### Blood composition changes

The result for the examination of blood constituents was shown in Table 11. We tested the contents of T-C, TG, HDL-C and LDL-C in the collected serum. After TDRM treatment, the level of T-C was decreased with statistical

**Table 11.** Changes of T-C on TRDM

Group	test	diff	t	p
Health (n=12)	pre	191.42±38.29	0.25	3.80
	post	191.67±42.19		
	t	-0.02		
Unhealth (n=31)	pre	232.10±38.61	-36.94	0.001
	post	195.16±26.72		
	t	4.38***		

\*0.05, \*\*0.01, \*\*\*0.001

significance ( $p<.001$ ) in both groups. The level of T-C in the unhealthy group was higher than that in healthy group.

The TG level was similar between two group before TRDM, but in unhealthy group the TG level was significantly decreased ( $p<.01$ ) (Table 12).

Before TRDM treatment, the HDL-C level was similar between two group. After TRDM, the HDL-C level was significantly increased in unhealthy group, while the level was unchanged in the healthy group (Table 13).

Before TRDM, the level of LDL-C in the unhealthy group was higher than that in healthy group (Table 14). In the healthy group, the LDL-C level was unchanged after TRDM treatment in the healthy group. However, the level for the unhealthy group was significantly decreased and closed to the healthy group's level.

The amount of cholesterol which is one of constituents of serum lipid is widely used as an indicator for diagnosis and treatment of coronary artery disease and hyperlipemia. The T-C concentration in blood is affected by several factors including kidney disease, diabetes, liver disease, thyroid gland disease, age, sex, race, dietary life, environment, smoking and drinking.

**Table 12.** Changes of TG on TRDM

Group	test	diff	t	p
Health (n=12)	pre	147.33±70.41	2.25	1.88
	post	149.58±67.34		
	t	-0.06		
Unhealth (n=31)	pre	149.61±57.91	-42.38	0.08
	post	107.23±42.58		
	t	3.28**		

\*0.05, \*\*0.01, \*\*\*0.001

**Table 13.** Changes of HDL-C on TRDM

Group	test	diff	t	p
Health (n=12)	pre	60.67±19.07	3.25	-1.89
	post	63.42±16.62		
	t	-0.38		
Unhealth (n=31)	pre	54.55±9.25	31.32	0.07
	post	64.74±12.38		
	t	-3.67***		

\*0.05, \*\*0.01, \*\*\*0.001

**Table 14.** Changes of LDL-C on TRDM

Group	test	diff	t	p
Health (n=12)	pre	77.17±16.59	-0.17	3.28
	post	77.00±20.17		
	t	0.02		
Unhealth (n=31)	pre	95.32±21.23	-14.9	0.01
	post	80.42±17.37		
	t	3.03**		

\*0.05, \*\*0.01, \*\*\*0.001

Aerobic exercise is considered to be increased the HDL-C level and declined fat combustion, weight and body fat rate. Importantly, it also reduces a risk of adult disease by changing ratio of T-C verse HDL-C [1].

Kim [7] studied the effect of aerobic exercise treatment to the diabetic patients. Although T-C, LDC-C, T-C/HDL-C and LDL-C/HDL-C were not meaningfully changed, HDL-C was significant increased and TG was decreased in the patients. Choi et al. [3] demonstrated that TG concentration was increased in patients with uncontrolled blood glucose compared to those of controlled blood glucose ( $p<.01$ ).

The study performed by Hwang et al. [5] with hypertension patient suggested that the levels of TC, TG and LDL-C was decreased with significant difference ( $p<.05$ ) and that of HDL-C was significantly increased ( $p<.01$ ) in the exercised group compared with the non-exercised group.

In conclusion, the TRDM treatment reduced the amount of T-C, TG and LDL-C and elevated the amount of HDL-C in the unhealthy group. These results are consistent to the data presented by other researches [1,5,7]. The TRDM treatment improves the elderly people's health. It may also prevent the occurrence of adult disease and reduce the cases for adult disease.

## References

- Baek, Y. H., K. W. Kim, T. H. Nam. 1998. Effects of Aerobic Exercise on Serum Lipids in Cholesterol-Dietary to Rats. 1998, *Korean J. Life Science*, **8**, 72-84
- Cho, S. B. 1995. Effects of the regular exercise program on the physical fitness of 60's for age. *The Korean Journal of Physical Education*, **34**, 277-285.
- Choi, Y. K. and T. H. Lee. 1995. Diabetes and Hyperlipemia. Medical Science Publication Co.
- Hinkleman, L. L. 1993. The effect of a walking program on body composition and serum lipids and lipoproteins in overweight women. *J. Sports Med. Phys. Fitness*, **33**, 49-581.
- Hwang, S. K. and S. Y. Jun. 1995. The Effects of bicycle exercise on physical fitness and blood metabolism variation middle age woman. *The Korean Journal of Physical Education*, **35**, 167-175.
- Kim, H. S. 1994. Assessment model of activity capacity to elderly people. *Fitness Science*, **43**, 1-369.
- Kim, J. I. 1993. The effect of aerobic exercise on glycolipid and apo-lipoprotein metabolism in insulin-nondependent diabetes. Master thesis, Department of Physical Education, Grad-

- uate School, Pusan National University.
8. Kim, T. W. 1999. The Effect of Aerobic Exercise on Health-Related Fitness and Blood Constituents in the Elderly Women over 65. Master Thesis, Department of Physical Education, Graduate School, Pusan National University.
  9. Lee, H. K. 1996. The effects of aerobic dance training with weight training on body composition, physical fitness, cardiovascular function and blood cholesterol level changes in college women. Master Thesis, Department of Physical Education, Graduate School, Seoul National University.
  10. Yu, C. H. and I. Z. Park. 1991. The Effect of Aerobic Dancing and Ca Supplementation on Lipid Metabolism in Postmenopausal Women. *The Journal of Korea Home Economics Association*. **29**, 59-70.