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출처
(Source)

한국체육과학회지 29(2), 2020.4, 1259-1267 (9 pages)

Korean Journal of Sports Science 29(2), 2020.4, 1259-1267 (9 pages)

발행처
(Publisher)

한국체육과학회

The Korean Society Of Sports Science

URL

http://www.dbpia.co.kr/journal/articleDetail?nodeId=NODE09331661

APA Style

Yoo, Dong-Hoon (2020). Effects of Dance Sports Exercise on Body Composition and Cardiovascular Disease Risk Factors in Elderly Men. 한국체육과학회지, 29(2), 1259-1267.

한국체육과학회지, 2020, 제29권 제2호, pp.1259-1267
The Korea Journal of Sports Science
2020, Vol. 29, No. 2 pp.1259-1267
https://doi.org/10.35159/kjss.2020.04.29.2.1259

Effects of Dance Sports Exercise on Body Composition and Cardiovascular Disease Risk Factors in Elderly Men

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댄스 스포츠 운동이 남성노인의 신체조성 및 심혈관질환 위험요인에 미치는 영향

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Abstract

The purpose of this study was to investigate the effects of dance sports exercise on body composition and cardiovascular disease risk factors in elderly men. Sixteen elderly men were divided into an experimental group that performed dance sports exercise group (DSG, n=8) and a control group (CON, n=8). Subjects in DSG participated in dance sports for 60 minutes/day and three times/wk for 12 weeks, whereas subjects in CON were asked to maintain normal lifestyle during the same intervention period. Using the SPSS 18 Program, the mean and standard deviation of each group were calculated and charted. The Wilcoxon signed-rank test was used for comparing pre- and post-test within groups, while the Mann-Whitney test was used to find difference between groups. Main results were as follows: 1) Body fat and waist hip ratio decreased significantly in DSG (p<.05). In comparison between groups, weight was significant difference in the between DSG and CON (p<.01). 2) SBP, TC, TG and LDL-C decreased significantly in DSG (p<.05), whereas there were no significant changes in the variables in CON. In comparison between groups, TC (p<.05), TG (p<.05) and LDL-C (p<.01) were significant difference in the between DSG and CON. As a conclusion, dance sports exercise program would be a positive role for body composition and cardiovascular disease risk factors by elderly men.

Key words: dance sports program, body composition, cardiovascular disease risk factors, elderly men

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Ⅰ. Introduction

Increasing age gradually diminishes the human body's physiology and metabolic ability, reduces functional flexibility such as overall physical fitness and exercise capacity decline, and reaction time and nerve degeneration and bone frailty it difficult to maintain basic daily life (Gu, 2006). The health problems of the elderly are usually complex and have characteristics that lead to chronic diseases (Kim & Shin, 2012). The causes of health problems vary, but their causes are typically decreased physical activity and increased obesity. Thus, it is essential to maintain and promote physical activity and physical strength for healthy old age (Ko & Won, 2009).

In general, changes in body fat in both men and women gradually increase from the age of 35, and after the age of 60, a decrease in body fat coupled with an increase in body fat causes obesity (Baek, Oh, & Shin, 2007). In addition, decreased muscle mass and increased body fat due to aging have a negative effect on blood lipids, and increase in triglycerides (TG), total cholesterol (TC) and low-density cholesterol (LDL-C) levels to increase mortality tate in the elderly (Kim & Ann, 2007). There have been countless studies of the exercise effects of obesity, hypertension, diabetes and blood lipids in older people (Cho, Lee, Park, Jin, Kim, Kim, & Kang, 2018; Kim & Kwon, 2018; Lee, Sim, & Lee, 2018). Despite the health benefits of exercise in many ways, the actual participation of the elderly is low. According to the "2016 Survey on Participation in Sports for the People's Life" of the Ministry of Culture, Sports and Tourism, about 40% of the population over the age of 60 do not participate in regular physical activity or do less than three physical sports per month (MCST, 2016).

Dance sports can be said to be fun and exciting because they perform various steps, change directions, and continuously perform various routines to match different genres of music. Furthermore, risk of injury is minimal as it can properly control exercise intensity, and it has both aerobic and anaerobic characteristics (Ko, 2011). Chodzko-Zajko et al. (2009) reported that dance sports are suitable for maintaining and promoting muscle strength and cardiopulmonary endurance in older people who lack physical activity. A number of studies showed the efficacy of dance sports in old people. Kim, Lee, & Sung (2010) reported that weight, body fat, BMI, TC and LDL-C were decreased, and maximal oxygen consumption was improved after a 9 week dance sports exercise in old women. Lee, Zhang, & Kim (2019) reported that irisin and adiponectin levels were increased, and blood lipids, TG and LDL-C were decreased after a 12 week dance sports exercise in obesity elderly women. Many studies have also reported that dance sports can be a positive effects of body composition and blood lipids in elderly women (Choi, 2013; Kim & Yang, 2017). However, research on the effects of dance sports exercise in the prior study mainly focused on elderly women, and research on the risk factors of body composition and cardiovascular disease risk factors of dance sports for elderly men is currently insufficient.

Therefore, the purpose of this study is to inves-

tigate the effects of a 12-week dance sports exercise performed within a senior welfare center on body composition and cardiovascular disease risk factors in elderly men, and to provide basic data on the development of elderly exercise program.

Ⅱ. Methods

1. Subjects

This study was performed in 16 elderly men aged 65 or older (66 to 77 yrs old) who no specific disease living in C city. The experimental groups consisted of dance sports exercise group (DSG, n=8) and control group (CON, *n*=8) randomly selected. The subjects provided written consent after fully understanding the study objectives and experimental contents prior to participating. The physical characteristics of the subjects are shown in 〈Table 1〉.

Table 1. Subject characteristics

Variables	DSG (*n*=8)	CON (*n*=8)
Age (years)	70.88±3.60	70.00±2.39
Height (cm)	164.74±5.41	164.63±5.718
Weight (kg)	65.13±11.18	67.04±9.28
BMI (kg/m^2)	23.85±2.95	24.70±2.96

Values are *Mean±SD*. DSG: dance sports group, CON: control, BMI: body mass index.

2. Experimental protocol

Body composition and cardiovascular disease risk factors for each variable were evaluated before and at the end of a 12-week dance sports program period.

1) Body composition analysis

The measurement of body composition was processed after arriving in laboratory, removing the carried metals, urinated 30 min before measurement, and taking 5 min of break in comforting status. Body weight, muscle mass, % body fat, and waist hip ratio (WHR) were measured by using body composition measuring instrument, inbody 720 (Biospace Co., Seoul, Korea).

2) Cardiovascular disease risk factors

Cardiovascular disease risk factors were divided into blood pressure and blood variables. Blood pressure was measured in the left upper arm using a standardized mercury sphygmomanometer. A sufficient stability for 10 min before measurement was taken and measurement was performed twice at intervals of 5 min.

Blood samples (10 ml) were collected from the antecubital vein after 12 h fasting. All blood samples were centrifuged for 20 min at 2500 rpm at 4℃, and plasma stored at -70℃ future analysis. The collected blood was analyzed for glucose, total cholesterol (TC), triglycerides (TG), high density lipoprotein cholesterol (HDL-C), and low density lipoprotein cholesterol (LDL-C).

3. Exercise programs

The dance sports exercise program for the elderly men was conducted three times a week for 12 weeks and 60 min for exercise session. During a 60 min session, the dance sports exercise program

consisted of: (a) a 10 min warm-up (that consisted of gymnastics and stretching); (b) a 40 min dance sports (that consisted of rumba, cha-cha-cha, and jive); (c) a 10 min cool down (that consisted of gymnastics and stretching). During the first four weeks, the dance sports group performed at an intensity of 40 to 56% of their maximal heart rate. From week 4 to week 12, the subjects worked out at an intensity of 57 to 82% of their maximal heart rate (Kim et al, 2010). Heart rate was monitored using a Polar heart monitor (Polar Electro Oy, Kempele, Finland) through the exercise sessions. The content of the dance sports exercise program was shown in 〈Table 2〉.

4. Statistical analyses

The data are shown as mean and standard deviation. The Wilcoxon signed-rank test was used for comparing pre- and post-test within groups, while the Mann-Whitney test was used to find difference between groups. The SPSS package version 18.0 (SPSS Inc, Chicago, IL., USA) was used to analyze the data. Statistical significance was set at p〈.05.

Ⅲ. Results

1. Body composition

The subject's body composition was shown in 〈Table 3〉. A comparison within groups showed that no statistical significance was found in all variables in body composition of the CON, but the subjects in the DSG had shown statistically significant decrease in body fat (Z=-2.243, p=.025) and WHR (Z=-2.565, p=.010).

Table 2. Dance sports exercise program

classification		Item	Method	Time
Warm-up		Gymnastics & stretching		10 min
Main exercise	Rumba (1-4 weeks)	Open hip twist, Fan, Hockey Stick, Underarm turn, Alemana, Closed Hip Twist(Fan), Overturned Hockey Stick, New York, Spot Turn, Side Step, Cucarachas(L to R), Progressive Back Walk, Right Underarm Turn, Hand to Hand	40-56 HRmax	40 min
	Cha-cha-cha (5-8 weeks)	Basic movement, New york, Spot turn, Time step, Hand to hand, Three cha cha, Under arm turn, Cross Basic, Open Basic, Foot change, Ronde basic, Hip twist basic, curl, Fallaway rock	57-71 HRmax	
	Jive (9-12 weeks)	Fallaway Rock, Fallaway Throwaway, Link & Link Rock, Change of Places R to L, Change of Places L to R, American Spin, Change of Hand Behind Back, The Walks, a. Triple, b. Single, c. Combinations, The Whip, Whip Throwaway, Stop and Go, Windmill, Toe Heel Swivel, Flick into Break	60-82 HRmax	
Cool-down		Gymnastics & stretching		10 min

Table 3. Results of body composition

Variables	Group	pre	Post	diff(%)	Z	*p*-value
Weight (kg)	DSG	65.13±11.18	64.20±10.16	-0.93±1.32	-2.107	.038*
	CON	67.04±9.28	67.88±8.96	0.84±1.44		
Muscle mass (kg)	DSG	43.65±4.92	44.08±4.20	0.43±0.91	.059	.065
	CON	45.05±3.87	44.49±4.68	-0.56±1.22		
Body fat (%)	DSG	27.18±6.26	26.04±6.24*#	-1.14±0.99	.004	.003**
	CON	27.19±6.74	27.93±7.04	0.74±1.08		
WHR (%)	DSG	0.95±0.04	0.93±0.04*#	-0.02±0.01	.115	.130
	CON	0.95±0.05	0.95±0.06	-0.01±0.02		

Values=*means±SD*. DSG: dance sports group, CON: control, WHR: waist hip ratio.
#significantly different Wilcoxon signed-rank test. **p<.01, *p<.05

When compared between groups after a 12-week of intervention, weight(Z=-2.107, p=.038) and body fat(Z=.004, p=.003) were statistically different.

2. Cardiovascular disease risk factors

The values for the subjects' cardiovascular disease risk factors are reported in 〈Table 4〉. A comparison within groups showed that no statistical significance was found in all variables in cardiovascular disease risk factors of the CON, but the subjects in the DSG experienced statistically significant decrease in SBP (Z=-2.383, p=.017), TC (Z=-2.524, p=.012), TG (Z=-2.524, p=.012) and LDL-C (Z=-2.521, p=.012).

When compared between groups after a 12-week

Table 4. Results of cardiovascular health-related factors

Variables	Group	pre	Post	diff(%)	Z	p-value
SBP (mmHg)	DSG	140.25±15.17	126.75±11.99*#	-13.50±8.96	-1.841	.065
	CON	138.63±8.94	134.88±11.92	-3.75±13.59		
DBP (mmHg)	DSG	85.00±12.25	78.50±9.29	-6.50±9.55	-1.052	.328
	CON	83.13±6.24	81.63±7.15	-1.50±8.40		
TC (mg/dL)	DSG	211.38±21.34	193.00±18.34*#	-18.38±11.21	-2.627	.007**
	CON	212.13±25.15	213.88±22.78	1.75±13.29		
TG (mg/dL)	DSG	130.75±22.33	115.13±22.96*#	-15.63±3.66	-2.840	.003**
	CON	128.75±25.45	127.38±25.90	-1.38±7.63		
HDL-C (mg/dL)	DSG	58.13±7.10	59.63±9.04	1.50±5.26	-1.477	.161
	CON	56.13±11.19	55.75±12.71	-0.38±12.09		
LDL-C (mg/dL)	DSG	179.40±28.58	156.40±28.01*#	-23.00±10.86	-2.417	.015*
	CON	181.75±35.15	183.60±35.70	1.85±21.44		

Values=*means±SD*. DSG: dance sports group, CON: control, SBP: systolic blood pressure, DBP: diastolic blood pressure, TC: total cholesterol, TG: triglyceride, HDL-C: high-density lipoprotein, LDL-C: low-density lipoprotein. #significantly different Wilcoxon signed-rank test. **p<.01, *p<.05

of intervention, there were statistically significant differences in TC (Z=-2.627, p=.007), TG (Z=-2.840, p=.003) and LDL-C (Z=-2.417, p=.015).

Ⅳ. Discussion

This study investigated the effects of dance sports exercise in elderly men. The results showed the subjects in the dance sports exercise group had positive improvements in both body composition and cardiovascular disease risk factors.

Decreased muscle mass and increased fat due to aging cause senile disorder. It has been reported that the main cause of this process is reduced physical activity (Toth, Matthews, Tracy, & Previs, 2005). Decreased physical activity causes a change in body composition, which is directly related to health. In this study, the subject's body composition showed positive change in weight and WHR. Kim, et al. (2010) reported effects of a 9-week dance sports program in elderly women. Although there was no change in lean body mass, there was a significant decrease in body weight, body fat, and BMI (body mass index). Lee et al.(2019) reported a significant decrease in weight and body fat after a 12-week of dance sports in elderly women. This results appeared similar to the results of this study.

There was no increase in muscle mass in previous studies and this study. This is because the effects of exercise on muscle mass vary depending on age, exercise intensity, frequency, time and type (Evans, Racette, Peterson, Villareal, Greiwe, & Holloszy, 2005; Kim, Kim, Oh, & Lee, 2016; Lee & Son, 2008). Further research including increased exercise intensity should also be carried out on improve the muscle mass in the elderly.

The level of a subject's cardiovascular disease risk factors is good indication of overall health. In this study, the analysis of cardiovascular disease risk factors included SBP, DBP, TC, TG, HDL-C and LDL-C.

Blood pressure readings between 120/80 mmHg and 140/90 mmHg could mean you're at risk of developing high blood pressure if you do not take steps to keep your blood pressure under control. If your blood pressure is too high, it puts extra strain on your blood vessels, heart and other organs, such as the brain, kidneys and eyes (Park, Oh, Na, Han, Choi, Ko, Whang, & Jeong, 2009). Yu, Chae, & Kim (2009) conducted a 12-week dance sports program and reported that systolic blood pressure decreased significantly, and that the diastolic blood pressure was not significantly different. This is consistent with the results of this study. This results appeared similar to the results of this study. Moderate-intensity exercise yielded benefits to blood vessels by helping them to maintain their essential elasticity, thus leading to a decrease in resting blood pressure (Palumbo, 2014).

Aging cause an overall change in fat metabolism and decreases HDL-C levels, while increasing TC and LDL-C levels. These negative changes have been reported through many previous studies that can be improved through regular aerobic exercise (Durstine, Grandjean, Davis, Ferguson, Alderson, & DuBose, 2001; Trejo-Gutierrez & Fletcher, 2007). After a 12-week of training, the results showed great benefits of the dance sports exercise. The subjects

in the dance sports exercise group experienced improvement in lower TC, TG and LDL-C compared to the subjects in the control group. These results of the survey are in agreement with previous studies showing the benefit of exercise training in elderly subjects (Lee et al., 2019; Vorup, Pedersen, Melcher, Dreier, & Bangsbo, 2017).

However, HDL-C after 12 weeks were not statistically different from the levels before the intervention. Kim et al. (2010) also reported that there was no significant difference in HDL-C as a result of the 9-week dance sports program. This is consistent with the results of this study. Lira et al. (2010) report that HDL-C increases in proportion to energy consumption during long-term physical activity and increases more in parallel with diet. Therefore, the results of this study are thought to be due to the lack of control of daily life and diet.

However, limitation of this research is as follows. First, this study examined only variables limited to physical health such as body composition and cardiovascular disease risk factors in elderly men. Second, there is a limit to generalization due to the small number of the subjects. Finally, the dietary intake of the subjects was not controlled. Therefore, an intervention study that supplements the limitations of this study should be conducted in the future.

Ⅴ. Conclusion

The study aimed to investigate the effects of dance sports exercise on body composition and cardiovascular disease risk factors in elderly men. The results showed that the subjects in the dance sports exercise group had better weight, body fat and waist hip ratio. Moreover, the subjects in the dance sports exercise group experienced significantly better total cholesterol, triglycerides and low density lipoprotein cholesterol than the subjects in the control group. Therefore, the findings indicate the suitability of the dance sports exercise as an alternative training program in elderly men, particularly in regards to its prevention of body composition and cardiovascular disease risk factors.

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논문투고일 : 2020. 02. 21
논문심사일 : 2020. 03. 22
심사완료일 : 2020. 03. 31