

Effects of Combined Exercise on Physical Fitness and Blood Lipids in Male Workers

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Abstract: Background/Objectives: The purpose of this study is to provide basic data for improvement of physical fitness and prevention of cardiovascular diseases and lifestyle related diseases in middle - aged male office workers by analyzing the effect of 12 week combined exercise on physical fitness and blood lipid in male office workers. **Methods/Statistical analysis:** This study was conducted on 12 week middle-aged male office workers divided into experimental group and control group. The experimental group was performed for 60 minutes including the warming up and cooled down three times a week for 12 weeks. The treatment program of the combined exercise group was performed for 60 minutes including warming up and cool down for 12 weeks, three times a week. The warming up and cool down were conducted for 10 minutes each with a focus on stretching. This exercise was performed for 20 minutes on the treadmill and 20 minutes on the lower body and upper body strength. The PASW 22.0 Statistical Program was used for pre-scan and post-mortem data to determine 12-week therapeutic effects. Technical statistics were proposed for each measurement period and applied by a two-way 2 - RGRM ANOVA to find interactions of treatment effects. The level of significance is set to 0.05.

Findings: Grip strength indicated that the interaction effect ($F=75.839, p=.001$) between the two groups was significant and Standing long jump also showed significant interactions ($F=1786.886, p=.001$). 20m Round trip run noted that the interaction ($F=9.474, p=.006$) between the two groups was significant ($p<0.05$). TC indicated that the interaction effect ($F=5.875, p=.026$) between the two groups was significant and TG also showed significant interactions ($F=7.117, p=.016$). HDL indicated that the interaction effect ($F=50.689, p=.001$) between the two groups was significant but LDL not showed significant interactions ($F=2.771, p=.113$).

Improvements/Applications: With those results, the 12 week combined exercise program can contribute to improvement of physical fitness and blood lipid level of male office worker and it seems to have a positive effect on health care.

Keywords: Combined exercise, Physical Fitness, Male Workers, Blood Lipids, Middle-aged male

I. INTRODUCTION

According to the results of the economic activity population in Korea in 2017, approximately 26 million people which is 60.2% of the Korean population over 15 years old are participating in economic activities in 2017. Looking at their employment status by occupation, there are about 4.6million (17.5%) office workers and about 5.7million(21.8%) managers and experts[1]. Despite the high percentage of white-collar workers among the economically

active population in Korea, national interest about their health was relatively low. The importance of health promotion for office workers who have relatively less national interest compared to production workers is emerging[2]. Office worker helps the managers, experts, and paraprofessionals when they are creating business plans and then carrying out the project according to the plan, and most of the duties of office worker is done by sitting on the chair[3]. Office workers tend to be physically less active than production workers because of inefficient work, and also reported that they spend most of the times by sitting at home. Thus, inactive and sedentary lifestyles can cause obesity, hypertension, hyperlipidemia, diabetes, metabolic diseases, and cardiovascular disease[4,5].

Of the office workers, 42.5% were eating irregularly, 52.3% were dine out at least once a day and 33.4% were skip the breakfast. The reasons of irregular eating are lack of morning time, anorexia due to stress, excessive work the day before, and complex personal relationships. Unlike three regular meals, snacks and late night meals contribute significantly to the nutrition and late-night meal interferes with the breakfast which is causing irregular eating habits[6-10].

Like this, office workers are faced with nutritional imbalances due to alcohols and dine out cause of excessive work and stress and It has been reported that the unbalanced dietary habits such as, dining out, skipping breakfast, digestion and imbalanced nutrition cause the risk of obesity and exposure to various adult diseases[7] [11].

Office workers are exposed to an environment that is prone to health hazards due to excessive work, stress, and frequent meals. Therefore, proper exercise should improve the physical and mental health of modern workers and further improve the quality of life. However, most of them are gave up because of the lack of time due to busy work life and get bored by repeating the same exercise method[12].

Many jobs have features that require a long time sitting in front of a computer. The demands of this profession include the ability to sit in a chair on the desk for about 8 to 9 hours. The work force of these occupations often does not participate in the proper physical exercise[13,14]. Specially, male office workers work with computer and do lot of mental work for most of working time at office and these working characteristics increase the prevalence of metabolic syndrome, a risk factor for cerebrovascular disease[15].

Sports scientists report that it is important to design,

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evaluate and use effective physical exercises that can be used in the workplace. The general daily performance of office workers can be improved through regular physical exercise. Physical exercise improves muscle strength and flexibility. Lower the risk of neck, shoulder and back injuries. And strengthen the spine. By doing so, the individual can greatly reduce pain, reduce daytime and night fatigue, and enjoy stable sleep without problems[16-18].

The American Academy of Sports Medicine[19] reported that all healthy adults between the ages of 18-65 requires 5 days a week, a minimum of 30 minutes of median aerobic physical activity, or 3 days a week, at least 20 minutes of high intensity physical activity as the sports therapy for the prevention of musculoskeletal disorders and the physical fitness. It has been reported that the combined exercise of aerobic and anaerobic is recommended for weight control and proper body composition[20]. The results of this study are as follows: The effect of exercise on body weight and body composition. These exercise therapies seems to induce the ultimately decrease in body fat due to additional increase in energy expenditure with increased in basal metabolism, increased in energy consumption during exercise, and increased in energy consumption due to an increase in excess oxygen consumption after exercise[21].

Participation and exercise of physical activity is more effective in improving the health of adults than any prescription provided by science or medicine today. Therefore, the purpose of this study is to provide basic data for improvement of physical fitness and prevention of cardiovascular diseases and lifestyle related diseases in middle - aged male office workers by analyzing the effect of 12 week combined exercise on physical fitness and blood lipid in male office workers.

II. MATERIALS AND METHODS

2.1 Subject of study

The purpose of this study was to investigate the effects of combined exercise for 12 weeks on physical fitness and blood lipid in male workers. For this purpose, 20 male workers were divided into two groups: the combined exercise group(EG, n = 10) and the control group(CG, n = 10). The physical characteristics of the subjects participating in the experiment are shown in <Table 1>.

Table1: Physical Characteristic of Subjects (M±SD)

Group	N	Age(yr)	Height (cm)	Weight(kg)	Fat (%)
EG	10	41.25±4.23	170.35±6.12	83.23±10.54	30.03±3.47
CG	10	42.10±5.05	171.59±5.90	84.96±10.22	29.44±4.30

2.2 Treatment program

The treatment program of the combined exercise group was performed for 60 minutes including warming up and cool down for 12 weeks, three times a week. The warming up and cool down were conducted for 10 minutes each with a focus on

stretching. This exercise was performed for 20 minutes on the treadmill and 20 minutes on the lower body and upper body strength. <Table 2>shows the exercise program. Control group did not perform any treatment for comparison with combined exercise group and lived same as usual.

Table 2: Exercise Program

Division	Intensity	Warm up/ Cool down	Main exercise
Periods (12week)	Treadmill walking: HRmax 60-70%, Resistance exercise: repeat 2sets 10times,	Body Stretching (warm up: 10min, cool down: 10min)	Treadmill walking: (20min) Resistance exercise: leg extension, leg curl-lying, lat pull down, bench press, chest fly, squat(20min)

2.3 Measurement

The physical strength test was performed by grip strength (Japan, TKK-5401), standing jump, and round trip. TC(total cholesterol), TG(triglyceride), LDL(low density lipoprotein cholesterol), and HDL(high density lipoprotein cholesterol) were measured. Blood, lipid, and physical activity during the 24 hours before alcohol, alcohol, The fasting state was maintained for 12 hours or more. Blood was collected for about 30 minutes and then blood was collected about 10 ml. The collected blood was analyzed by the hospital clinic department.

2.4 Data analysis

The data analysis of this study used the SPSS22.0 program. To calculate the mean and standard deviation of the two

groups, it was analyzed using two - way RGRM ANOVA to analyze the interaction. The significance level was conducted in a = . 05.

III. RESULTS

3.1 Physical Fitness

The purpose of this study was to investigate the effects of combined exercise for 12 weeks on physical fitness and blood lipid in male workers. Grip strength indicated that the interaction effect(F=75.839, p=.001) between the two groups was significant and Standing long jump also showed significant



interactions($F=1786.886$, $p=.001$). 20m Round trip run noted that the interaction($F=9.474$, $p=.006$) between the two groups was

significant ($p<05$). <Table 3>.

Table 3: Physical fitness ANOVA

factor	group	Pre	Post	P
Grip strength(kg)	EG	49.16±7.25	53.28±8.97	Group*period: .001 Group: .396 Period: .001
	CG	48.37±8.48	47.50±9.05	
Sanding long jump (cm)	EG	170.54±7.72	185.39±8.76	Group*period: .001 Group: .352 Period: .001
	CG	173.98±9.29	174.50±9.03	
Round trip run (sce)	EG	18.47±3.24	17.10±4.50	Group*period: .006 Group: .581 Period: .007
	CG	18.86±4.36	18.87±5.01	

3.2 Blood Lipid

The purpose of this study was to investigate the effects of combined exercise for 12 weeks on physical fitness and blood lipid in male workers. TC indicated that the interaction effect($F=5.875$, $p=.026$) between the two groups was

significant and TG also showed significant interactions($F=7.117$, $p=.016$). HDL indicated that the interaction effect($F=50.689$, $p=.001$) between the two groups was significant but LDL not showed significant interactions($F=2.771$, $p=.113$). <Table 4>.

Table 4: Blood lipids ANOVA

factor	group	Pre	Post	P
TC (mg/dL)	EG	201.47±51.48	180.34±43.44	Group*period: .026 Group: .448 Period: .001
	CG	210.36±40.19	205.17±59.37	
TG (mg/dL)	EG	150.21±75.38	110.84±40.07	Group*period: .016 Group: .344 Period: .001
	CG	159.46±60.80	150.98±51.11	
HDL (mg/dL)	EG	45.66±9.88	50.23±8.74	Group*period: .001 Group: .463 Period: .001
	CG	44.18±10.05	45.38±9.08	
LDL (mg/dL)	EG	120.56±30.37	108.22±40.05	Group*period: .113 Group: .584 Period: .011
	CG	123.98±21.30	120.77±35.69	

IV. DISCUSSION

The physical activity level of the most of office workers is very low because of working in sitting condition and the reduction of the level of physical activity due to the long time sitting leads to the reduction of energy consumption of the human body. Eventually this leads to inadequate influence on physical and mental health[22] [23]. Therefore, lack of physical activity due to sedentary lifestyle increases mortality and the major causes of non-traumatic chronic diseases such as heart disease, type 2 diabetes, and cancer[24] [25]. This study investigated the changes of physical fitness and blood lipid levels according to complex exercise for 12 weeks for middle-aged male office workers and the results of this study were compared with those of previous studies.

In a previous study on the change of physical fitness through workout, Oh & Park[26] reported that the physical fitness of the workers was increased by the 12-week combined exercise program, and Park, Chae & Jang[27] reported that a 12-week health promotion program for male workers had a positive effect on improving their physical fitness. In a study by Yoo & Lee[28], male workers were interviewed three times a week the cardiopulmonary endurance was significantly

increased, but muscle strength and flexibility were not changed. In a study by Yoon[29], The results of high strength circuit training for obese male workers 3-4 times a week and for 12 weeks 30 minutes showed that the fitness increased, and Lee[30] reported that six-week rope-jumping training for office workers improved physical fitness.

In the present study, the 12-week combined exercise for male office workers showed significant improvement in the grip strength, sanding long jump, and round trip run. Thus, the 12-week combined exercise in this study confirmed the possibility of improving the physical fitness of male office workers.

Physical fitness can be improved through regular exercise, but physical strength can be reduced by various factors such as aging, disease, lifestyle and environment. Therefore, physical fitness is closely related to everyday life, and the increase of physical activity through regular exercise is expected to be very effective for improving the physical fitness of male office workers.

In a previous study on the changes in blood lipid levels through exercise in office workers,



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Yoon[29]reported on the improvement of blood lipid level in high-intensity circuit training for obese male workers 3-4 times a week and for 12 weeks for 30 minutes, and Park, Chae& Jang[27]reported that the 12-week health promotion program for male workers had a positive effect on blood lipids. Also, Ha, Roh&Park[31]reported that mild physical activity performed in shift workers and adult males improves HDL levels, but Kim[32] reported that the total cholesterol level was not significantly different among the workers in the industrial area.

In this study, a 12-week combined exercise (walking and lowering exercise) exercise for male office workers showed significant improvement in TC, TG and HDL-C. These results suggest that exercise in this study increases lipid utilization activity in mitochondria, induces hyperglycemia of glycogen synthase, and increases the activity of free fatty acids in the blood and the utilization of energy source of lipoproteins and phospholipids[33] [34] [35]. Therefore, the 12-week combined exercise in this study confirmed the possibility of improving the blood lipid of male office worker.

V. CONCLUSION

The purpose of this study is to compare the changes of physical fitness and blood lipids according to the 12 weeks' exercise program of male office workers, and in order to achieve the purpose of the study, total of 20 male office workers were divided into two groups: 10 in exercise group (EG) and 10 in control group (CG), and performed 12 weeks of combined exercise program. As results, following conclusions were obtained. After applying complex exercise program, grip strength, sanding long jump and round trip run showed significant improvement in physical strength, and total cholesterol (TC), triglyceride (TG), and HDL-cholesterol (HDL-C) showed significant improvement in blood lipid. The LDL-cholesterol (LDL-C) decreased, but there was no significant difference. With those results, the 12 week combined exercise program can contribute to improvement of physical fitness and blood lipid level of male office worker and it seems to have a positive effect on health care. Therefore, it is suggested that habituation of regular life patterns and practice of exercise can prevent the improvement of physical fitness, cardiovascular diseases and lifestyle related diseases of male office workers. In the future, it will be necessary to examine more workers according to the type of work, and it will be necessary to study different conditions such as exercise and diet, and differentiation of exercise type (time, duration, strength, etc.).

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