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Influence of Exercise and Drinking Habits on Their Body Composition and PHYSICAL FITNESS in Middle-Aged Men

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Abstract

This study was to investigate the effects of exercise and drinking habits on the body composition and physical fitness in middle-aged men. The participants were divided into two groups: 1 times a week Drinker group (n=15) and 3 times a week Drinker group (n=15). The exercise and drinking habits for 12 weeks. The results of this study were as follows: First, In terms of change in body composition due to drinking and exercise, the group drinking once a week shows a statistically significant decrease in weight, body fat ratio, BMI, and abdominal fat rate, but doesn't show any significant difference in muscle skeletal mass. And the group drinking three times a week doesn't show any significant difference in all variables of body composition. In addition, difference between groups due to drinking and exercise doesn't reveal any statistically significant difference in all variables of body composition at the pretest. However, at the posttest, weight, bodyfat ratio, BMI, and abdominal fat ratio showed a statistically significant difference. Second, As for the physical fitness, there were significantly increased in left grip strength, right grip strength, muscle endurance, cardiopulmonary endurance, flexibility, quick reaction, and agility the 1 times a week Drinker group. As conclusions, this study confirmed that the exercise and drinking habits could improve the body composition and physical fitness of middle-aged men. However, there is a need for more specific exercise programs to be developed for the continual improvement of athletic performance in exercise and drinking habits along with further studies to confirm the physiological benefits of those programs.

[Keywords] Exercise, Drinking Habits, Body Composition, Physical Fitness, Middle-Aged Men

1. Introduction

Physical activities through regular exercise are required to live a healthy life. However, recent economic development by rapid industrialization spread sedentary life to drastically reduce human physical activities[1]. More seriously, although the decrease in physical activities of modern people accompanied by heavy stress from work, drinking, and smoking expedites the occurrence of chronicle diseases[2], drinking to relieve mental and physical stress continues to increase[3].

According to the publication of the Ministry of Health and Welfare[4], people who do

the medium level of exercise, meaning the exercise of 1 and 30 hours, at least 5 times a week, decreased from 18.7% in 2005 to 14.5% in 2008, and those who drink more than once a month increased from 54.6% in 2005 to 59.5% in 2008. In particular, the drinking rate of men was revealed to be at least twice as high as that of women, and the highly dangerous drinking rate of men in 2011 was reported to soar 4 times higher than that of women, so men were reported to be relatively more easily exposed to risk in health from drinking than women[5].

Heavy stress from work, lack of physical activities, and excessive drinking of modern people not only hinder from living a regular

life but cause chronic diseases such as adult diseases, and regular exercise has been suggested as the solution for this. Regular exercise improves the function of musculoskeletal system enabling repetitive physical activities, enhances physical balance and flexibility, reduces the risk to fall, and improves cardiopulmonary function to decrease cardiovascular mortality[6]. Besides, it enhances physical fitness to improve quality of life, relieves stress, and advances the ability to cope with stress[7].

Reports on exercise and drinking say that sustained aerobic exercise helps alleviate drinking craving and stress[8], and excessive drinking over a certain level brings memory loss, thinking disorder, impaired exercise function, gastrointestinal disturbances, impaired sexual and liver function[9]. In particular, among men, drinking over a certain level is relevant to obesity, and drinking frequency is related to the increase of blood lipid[10].

As seen above, drinking causes metabolic imbalance in the body, recession and disorder of each organ, and becomes a direct and indirect reason for diseases. Although to stop drinking is the best way to resolve the side effects of drinking and smoking, some are using solutions of nutrition or exercise. Among

them, regular exercise is effective in improving cardiovascular function[11][12], reducing the occurrence rate of various chronic diseases, and relieving symptoms of some diseases[13][14]. Therefore, this study aims to identify the influence of drinking and regular physical activities on body composition and physical fitness in middle-aged men.

2. Materils & Methods

2.1. Subject of study

This study was composed of participants in the process of qualification training for a double major of sports education performed by secondary school teacher training center and hosted by the Ministry of Education from March to August, 2016. The subjects of the study were divided by 2 groups of 15 participants drinking less than once a week and another 15 drinking over 3 times a week each. In order to confirm they show same physical and exercise function, the age group over 40 years was randomly selected. As the study aims to identify the influence of exercise and drinking habits on physical composition and fitness, difference due to exercise experience was not considered. The physical characteristics of the participants are shown in <Table 1>.

Table 1. Physical characteristics of subjects.

Mean±SD

Items	N	Age (Years)	Height (Cm)	Weight (Kg)
1 times a week drinker	15	49.96 ± 4.14	168.36 ± 7.42	73.74 ± 13.75
3 times a week drinker	15	46.29 ± 5.30	167.66 ± 8.48	76.68 ± 12.98

2.2. Exercise program

Exercise program classification in accordance with qualification training for a double major of sports is shown in <Table 2>.

Table 2. Exercise program.

Items	Set/Time(min)
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1-8week	1. Football	2/30
	2. Tennis	2/30
	3. Golf	2/30
	4. Gymnastics	2/30
9-16week	5. Athletics	3/45
	6. New sports	2/15
	7. Swimming	2/30
	8. Ping-pong	2/30
17-24 week	9. Badminton	2/30
	10. Basketball	2/30
	11. Dance sports	2/30
	12. Volleyball	2/30

2.3. Measure and method

2.3.1. Measurement of physical composition

On the participants' arrival at the place of test, all the metal they carried on were first removed from their body, and then they were told to relax for 5 minutes after urinating to start the measurement of physical composition. Weight(kg), BMI(kg/m^2), WHR(%), and body fat ratio(%) were measured by using In-body 729(Biospace Co., Seoul, Korea). To implement the analysis of body composition, participants were told to stand straight with their arms and legs a bit apart, and then to step up the marked position of the instrument with bare feet holding the electrode handle with a hand according to the order of measurement of the instrument.

2.3.2. Fitness test

As the fitness test items of the study are based on Article 2 and 7 of the School Health Law and Article 2, 3, and 6 of the School Fitness Test Regulations (by ordinance of the Ministry of Education), quick reaction (standing long jump), flexibility (sitting forward bending), cardiopulmonary endurance (jump rope), muscle endurance (push up), muscle strength (grip strength), and agility (side step test) were measured according to the fitness test method students.

2.3.2.1. Push-up

The subjects are told to reach their arms apart with shoulder width and then to hold

the push-up rod with the fingertips facing forward putting both feet together. In this posture, arms should be 90 angles to the ground, and head, shoulders, waist, hip, and legs should be straight. When the forearms and shoulders are horizontal by bending arms, tell them to return to the original posture. After a minute of the performance, the total number of repetitions was recorded.

2.3.2.2. Sit-up

The subjects are told to be sure to stand knees lying down with their fingers crossed under the head. They stand their upper body for their elbows to reach their knees and lie down again. At this point both shoulders should touch the ground. When standing up, rebounding action is not allowed. After a minute of the performance, the total number of repetitions was recorded.

2.3.2.3. Side step

3 parallel lines are marked on the floor with 100m apart each other. The subjects are told to stand not stepping on the center line. On the signal of "go", they do side steps on the right to go over the right line with a right foot. This is counted as once. As soon as they go over the right line, they should go back to the original posture. Then it's counted as twice. After returning, they do side steps again to go over the left line this time with a left foot, it's three times. After 2 sets of 10 seconds of the performance, the better result between them was recorded.

2.3.2.4. Sitting forward bending

The subjects are told to sit upright with their knees stretching fully so that their bottoms of both bare feet may touch the vertical face of the measuring instrument. The interval between feet should be less than 5 cm. And they are told to take "ready" action by overlapping the left palm on the back of the right hand with both palms stretching. Testers gently press subjects' knees so that they may not bend when subjects bend forward. After 2 sets of performance, the better result between them was recorded in 0.1 cm increments.

2.3.2.5. Standing long jump

The subjects are told to stand not cross the marked line on the springboard and to do enough preliminary exercise of arms and trunk to jump forward as long as possible. Be sure not to step on the starting line, and to measure the most back part of the landing point. After 2 sets of performance, the better result between them was recorded in 0.1 cm increments.

2.3.2.6. Jumping rope

The subjects first do some preliminary exercise of all parts, such as shoulders, waist, knees, ankles, wrists etc. used when jumping rope. After some application exercise with both hands gripping the rope, they are told to slightly bend their knees and to use the front part of the soles instead of the entire soles when landing to alleviate the impact on their body and knees. After a minute performance, the total number of performance was recorded.

2.4. Data process

To process the data of this study, the mean and standard deviation of all the data collected using SPSS 20.0 (window statistical package) were calculated. Paired t-test was conducted to test the significance before and after the experiment in a group while independent sample t-test was used for the significance test before and after between groups. The significance level was $p < .05$.

3. Results

3.1. Change in body composition

<Table 3> shows changes in body composition due to drinking and exercise. The change of the once-a-week drinker group shows statistically significant decrease in weight ($p=.000$), body fat ratio ($p = .000$), BMI ($p=.000$), and abdominal fat ratio($p=.000$) but doesn't show any significant difference in terms of musculoskeletal mass($p=.346$). The three-times-a-week drinker group doesn't show any statistically significant difference in all variables. In addition, in the difference between groups due to drinking and exercise, whereas pre-test doesn't show any statistically significant difference in all variables of body composition, post-test shows statistically significant difference in weight($p=.000$), body fat ratio($p = .000$), BMI($p=.000$), and abdominal fat ratio($p=.000$).

Table 3. The changes of body composition.

M±SD

Items	Groups	Pre	Post	t*
Weight (Kg)	1 times a week Drinker (n=15)	73.74±13.75	70.20±12.77	3.059†††
	3 times a week Drinker (n=15)	75.46±16.49	76.12±16.74	-0.555
	t**	-1.098	-3.106†††	
Skeletal muscle mass(kg)	1 times a week Drinker (n=15)	29.21±5.94	29.91±5.78	-0.722
	3 times a week Drinker (n=15)	31.58±5.44	31.87±5.53	-0.814
	t**	-1.083	-1.023	

BMI(kg/m ²)	1 times a week Drinker (n=15)	25.61±3.86	24.34±3.52	3.812†††
	3 times a week Drinker (n=15)	25.25±4.80	25.50±4.96	-0.616
	t**	0.202	-3.089†††	
WHR(%)	1 times a week Drinker (n=15)	0.90±0.04	0.87±0.04	4.141†††
	3 times a week Drinker (n=15)	0.89±0.05	0.90±0.05	-0.380
	t**	0.822	-3.124†††	
Percent body fat(%)	1 times a week Drinker (n=15)	21.33±7.94	16.67±7.50	4.681†††
	3 times a week Drinker (n=15)	19.08±10.71	19.28±10.69	-0.330
	t**	1.102	-4.786†††	

Note: * Paired t-test between pre- and post-values in a group

** Independent sample t-test' results between pre- and post-values in both groups

†, ††, and ††† mean P<0.05, P<0.01, and P<0.001, respectively.

3.2. The change in fitness variables

<Table 4> shows the change of fitness variables due to drinking and exercise. The once-a-week drinker group shows statistically significant change in all variables of left grip strength (p=.000), right grip strength (p=.000), muscle endurance (p=.000), cardiopulmonary endurance (p=.000), flexibility (p=.000), quick reaction (p=.000), and agility (p=.000), while the three-times-a-week drinker group doesn't show any statistically significant change in all variables. Furthermore, at the

pre-test of difference between groups of fitness variables due to drinking and exercise, cardiopulmonary endurance(p=.004) and quick reaction(p=.000) show significant difference while at the post-test all the variables including left grip strength(p=.000), right grip strength(p=.000), muscle endurance(p=.000), cardiopulmonary endurance(p=.000), flexibility(p=.000), quick reaction(p=.000), and agility(p=.000) show statistically significant difference.

Table 4. The changes of fitness variables.

M±SD

Items	Groups	Pre	Post	t*
L	1 times a week Drinker (n=15)	33.68±4.06	38.77±4.55	-6.333†††
	3 times a week Drinker (n=15)	33.55±3.73	33.23±3.87	1.252
	t**	0.102	-6.348†††	
Muscular strength	1 times a week Drinker (n=15)	32.85±3.54	34.54±1.77	-4.966†††
	3 times a week Drinker (n=15)	32.55±3.63	32.83±2.78	-0.938
	t**	0.210	-4.896†††	

Muscular endurance	1 times a week Drinker (n=15)	32.50 ± 4.23	39.83 ± 3.19	-6.134†††
	3 times a week Drinker (n=15)	31.58 ± 5.44	36.67 ± 35.55	-4.664†††
	t**	-0.638	-3.634†††	
Cardiorespiratory endurance	1 times a week Drinker (n=15)	99.75 ± 12.69	127.58 ± 11.91	-12.805†††
	3 times a week Drinker (n=15)	102.83 ± 13.37	109.83 ± 11.37	-3.611†††
	t**	-2.688††	-8.884†††	
Flexibility	1 times a week Drinker (n=15)	13.36 ± 4.47	15.17 ± 3.41	-3.395†††
	3 times a week Drinker (n=15)	11.95 ± 4.41	12.39 ± 4.21	-0.822
	t**	-1.022	-3.885†††	
Muscular power	1 times a week Drinker (n=15)	187.92 ± 15.83	206.42 ± 17.67	-10.947†††
	3 times a week Drinker (n=15)	192.67 ± 10.99	197.92 ± 6.52	-1.730
	t**	-3.925†††	-8.922†††	
Agility	1 times a week Drinker (n=15)	46.75 ± 1.76	49.83 ± 1.80	-15.976†††
	3 times a week Drinker (n=15)	47.75 ± 1.91	47.83 ± 2.29	-0.178
	t**	-0.678	-10.006†††	

Note: * Paired t-test between pre- and post-values in a group

** Independent sample t-test' results between pre- and post-values in both groups

†, ††, and ††† mean P < 0.05, P < 0.01, and P < 0.001, respectively.

4. Discussion

As the result of analysis of influence of drinking habits and exercise on body composition and fitness for 30 middle-aged men (15 of once-a-week drinker, 15 of three-times-a-week drinker), the study discusses as below.

Regular exercise and sustained physical activity have been reported to have a positive effect on body composition by reducing the body fat of patients suffering from metabolic syndrome and cardiovascular disease as well as healthy adults not having specific medical disorders[15]. This study also shows that regular exercise affects the change of body composition by groups. However, the group with more than three-times-a-week drinking habits has relatively higher obesity and body fat

index as well as higher body mass index and abdominal obesity ratio than the group with less than once-a-week drinking habits. This indicates that even if you regularly exercise, drinking more than a certain period of time makes it difficult to control your body weight and body fat. In particular, drinking has been reported to prevent liver from burning fat and to reduce the metabolism of fat and carbohydrates[16]. Moreover, drinking increases appetite, delays satiety, and increases the amount of intake, ultimately leading to increase weight and body fat[17]. Among previous studies on drinking and exercise, "Research on middle-aged men due to drinking habits[18]" reported that there was a statistically significant difference in the weight, body fat ratio, BMI, and WHR of the

alcoholic drinkers compared to the non-alcoholic drinkers, and Im Yeol-lee et al[19] reported that the risk of metabolic syndrome increased with increasing drinking. These results are consistent with the results of our study in which the body mass index of the group having more than three-times-a-week drinking habits was higher than that of the group having less than once-a-week drinking habits, implying that drinking habits have a great influence on the change in body mass. In addition, it is likely that the high calorie side food consumed during drinking is accumulated in the body rather than being used as an energy source, resulting in weight gain.

Excessive drinking habits may increase the risk of metabolic syndrome and the prevalence of adult diseases and complications due to obesity[20]. And weight control is one of the most proper ways to lower the risk of metabolic syndrome. It's possible to control weight through dietary and exercise regimens, and the effect seems to be maximized when both of the regimens are combined. As effective exercise regimen, low intensity aerobic exercise for a long time such as jogging, climbing, walking, and cycling is widely known to be good, but combined training of aerobic exercise and strength training is more recommended for prevention of yo-yo syndrome, which has shown a positive change in the risk factor of metabolic syndrome[21]. Therefore, it is important clinically to suggest exercise regimens as the most effective preventive and therapeutic methods to address the risk factors of metabolic syndrome[22]. As the results of this study, the group with less than once-a-week drinking habits showed higher muscle strength, muscle endurance, cardiovascular endurance, flexibility, agility and agility than the group with more than three-times-a-week drinking habits.

This is consistent with the findings that drinking and exercise of obese men affect body composition and fitness by Nam Sangnam and Ahn Sang-hyun[23] and supports the results that drinking over a certain level causes decline of exercise function. As such, drinking increases the risk of metabolic syndrome, such as obesity by excessive caloric intake and causes a social issue of impaired

quality of life by heightening the prevalence of cardiovascular diseases through deteriorated physical fitness due to drinking. As the improvement of lifestyle and adult diseases due to alcoholic drinking can be obtained through regular exercise, this study has identified the relationship between drinking habits and exercise and the influence of drinking and exercise on body composition and physical fitness of middle-aged men.

5. Conclusion

The study draws the conclusion as follows as a result of comparative analysis of influence of drinking habits and exercise on body composition and fitness for 30 middle-aged men(15 once-a-week drinkers and 15 three-times-a-week drinkers).

1. In terms of change in body composition due to drinking and exercise, the group drinking once a week shows a statistically significant decrease in weight, body fat ratio, BMI, and abdominal fat rate, but doesn't show any significant difference in muscle skeletal mass. And the group drinking three times a week doesn't show any significant difference in all variables of body composition. In addition, difference between groups due to drinking and exercise doesn't reveal any statistically significant difference in all variables of body composition at the pretest. However, at the posttest, weight, body fat ratio, BMI, and abdominal fat ratio showed a statistically significant difference.

2. When reviewing the change of fitness variables due to drinking and exercise, the change of fitness variable of the group drinking once a week shows significant difference in all variables, such as left grip strength, right grip strength, muscle endurance, cardiopulmonary endurance, flexibility, quick reaction, and agility while that of the group drinking three times a week doesn't show any statistically significant difference in all variables. Furthermore, at the pretest of inter-group difference of fitness variables due to drinking and exercise shows statistically significant in cardiovascular endurance and quick reaction

while the posttest shows statistically significant difference in all variables, such as left grip strength, right grip strength, muscle endurance, cardiopulmonary endurance, flexibility, quick reaction, and agility.

When seen comprehensively, it is certain that drinking habits of middle-aged men influence the change in body composition and the relationship between drinking and exercise as well. These findings suggest that excessive drinking has a bad effect on body composition and physical fitness. Therefore, if future studies would develop exercise programs proper for each age group and plans to reform bad drinking habits through the examination of drinking habits from a wide range of age groups and their daily exercise habits, it will provide abundant information for prevention and treatment of obesity, metabolic syndrome, and adult diseases due to drinking, which are recently emerging as a social issue.

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